would range from 15.2 to 54.0 µg/m^3* (amended from the original petition in a letter dated June 8, 2000).

Van Alphen (1999) also used a standard mathematical air concentration model to estimate indoor air lead levels from the burning of lead-cored wick candles. He used the following set of assumptions in the model: one candle burns for 1.5, 3, or 6 hours per day; the room is 25 or 50 m^3; and the air exchange rate is 0, 0.25, 0.5, 0.75, or 1.0 per hour. Depending on the set of assumptions used, the resulting 24-hour average air lead levels for candles emitting 500 or 1000 µg/hour range from 0.6 to 209.2 µg/m^3.

Van Alphen estimated lead uptake in children via inhalation using the following assumptions: respiration rate is 6 m^3/day for children; lung retention of submicron particles is 35 to 50%; uptake is 90% of the retained lead; amount of time spent indoors is 80%. Thus, a 2- to 3-year-old child exposed to average indoor air lead levels of 5 µg/m^3 would have a lead uptake of 8.0 to 11.5 µg/day (lead uptake is the amount absorbed into the body from inhalation intake).

Krause (1999) reported the results in terms of the quantity of lead an adult or child would inhale, but he did not report the average air lead concentrations that would result from candle burning. His exposure model assumed that a candle is burned 4 hours/day, the room volume is 226 m^3, and the air exchange rate is 0.25 per hour. He assumed that residents spend 14 hours per day indoors, including the 4 hours of candle burning. With these inputs, he estimated that children would experience a daily dose of lead from the candles of 0.26 to 95 µg/day. A candle that emitted 300 µg/hour was estimated to contribute about 13 µg/day.

Lead Content and Releases from Zinc or Tin Wick Cores

Lead may be a contaminant of metals used as wick cores. The lead content of zinc core has been determined by CPSC (CPSC, 2000) and others (Ungers *et al.*, 1999a) to range from about 0.0005% to 0.06% (5-600 ppm) by weight in the metal. The emissions of lead from zinc wicks were found to be below the limits of detection of the analytical methods used by CPSC and

* Although Public Citizen did not report the estimated lead emissions from the candles, by using their estimated air levels and set of assumptions, and a standard mathematical air concentration model, CPSC staff determined that Public Citizen analysis corresponds to emissions rates of about 1,570 to 5,600 µg/m^3.

Ungers *et al.* (1999a). These limits of detection were 25 µg/hour (CPSC) and 0.014 µg/hour (Ungers *et al.*, 1999a).

Ungers *et al.* (1999b) also determined the lead content of tin core. They found that a sample of tin core contained about 0.015% (150 ppm) lead by weight. The lead released during burning was below the limit of detection (0.012 µg/hour).

Limitations and Other Considerations

All of these analyses rely on several assumptions about exposure scenarios. Children's exposure to the lead released from burning candles depends not only on the amount of lead released and subsequent air lead levels, but also on the amount of time spent in the room with the elevated air lead levels, the children's breathing rates, and the amount of inhaled lead that is absorbed into the body. These factors are discussed below.

Candle Burn Time

The assumption of burning one candle for 3 to 4 hours per day is conservative, but it may represent the practice of consumers who use candles on a regular basis.

Room Size/volume

For a given lead emission rate from a candle, the air lead level and the resulting exposure estimate will change if the room volume changes. The CPSC staff and Public Citizen assumed a 15 ft. x 15 ft. x 8 ft. room (51 m^3); van Alphen used 25 or 50 m^3. Krause used 226 m^3. Other values for this parameter commonly used in health hazard or risk assessments range from 85 m^3 for a "typical" family room (Babich, 1996) to 114 m^3 for an open kitchen-dining-living room (NIST, Hazard I model) to 275 m^3 for the first floor of a house (Traynor *et al.*, 1989) to 360 m^3 for a whole house (Traynor *et al.*, 1989). A smaller room volume would result in a greater air lead concentration, resulting in a higher estimate for lead exposure, relative to a larger room.

Staff choose a medium-sized enclosed room as the model room because it represents a situation that is both reasonable and conservative in that exposures in such a room would be on the high end of expected exposures within the home.

Air Exchange Rate

The air exchange rate in a room or home is dependent on a number of factors, including open doors or windows and the use

of fans, furnace, air conditioning, or other air handlers. CPSC staff believes 0.5 air changes per hour is reasonable for a moderately tight whole house, but that room to room air movement is about 3-4 air changes per hour with no HVAC running. If HVAC is on, the house will approximate a single volume.

CPSC staff used a value of 0.5 air changes per hour for the medium-sized room. Public Citizen used 0.25 for a medium-sized room, while Krause used 0.25 for a small house. Van Alphen used values from 0 to 1 air changes per hour for small or medium sized rooms. A value of 0.25 or 0.5 air changes per hour is conservative, but not unreasonable for an enclosed room.

A smaller value for this variable would result in a greater air concentration of lead in the room, while a larger value for air exchange rate would result in lower air lead concentrations.

Candle Variables

The burning characteristics of candles, as well as the amounts of lead emitted from lead-cored wick candles may vary substantially between candle types and brands. The variability may depend on a number of factors, such as the size of the lead core (*i.e.*, the diameter of the wire), the length of the wick above the wax, wax characteristics, including fragrance and other additives, and the presence of drafts.

Even among identical candles, lead emissions may vary widely (van Alphen, 1999). Since the specific reasons for the variability are not known, it is not possible to predict whether a lead-containing candle will emit small amounts or relatively large amounts of lead during burning.

Other Exposure Variables

Exposure and risk assessments rely on several other variables, including respiratory rates, the amount of time spent indoors, and the amount of lead that is absorbed into the body from a particular route of exposure. While the assessments described above did not use the same values for these variables, the ranges of the values used are not unreasonable.

Lead Deposition

The analyses presented above assumed that no lead emitted from a candle was lost from the air by deposition onto surfaces in the room.

Deposition would result in decreased exposure to lead from the air, but could result in increased exposure from contact with contaminated surfaces. In addition, unlike airborne lead, which may be cleared from the air, the lead deposited in a room may remain accessible to a child for an extended period of time. A child could be exposed repeatedly to the lead deposited on floors, furniture, toys, or other objects through direct mouthing of the surface or object or by hand-to-mouth contact.

The amount of lead emitted from a burning candle that deposits on surfaces in the room is not known, but lead may be hazardous whether the exposure occurs through inhalation of airborne lead or through ingestion of lead from surfaces.

Summary and Conclusion

CPSC staff and other researchers have shown that candles containing lead-cored wicks may emit relatively large amounts of lead into the air during candle burning. Candles analyzed by CPSC and other researchers emitted lead up to 2,200 µg/hour during burning. The resulting air lead concentrations depend on factors such as room size and air exchange rate; a candle burning for 4 hours/day, emitting lead at 2,200 µg/hour in a 51 m^3 room with 0.5 air changes/hour would result in an average air lead level of 14.2 $\mu g/m^3$. CPSC staff analysis indicates that exposure to lead emissions from candles above about 430 µg/hour contributes to excess lead exposure.

The data show that the amount of lead released into the air during burning of lead-cored wick candles varied greatly among the tested candles. This was true even among samples of several identical candles (van Alphen, 1999). The reasons for this variability are not known. Thus, it is not possible to predict whether a particular lead-containing candle will emit small amounts or relatively large amounts of lead during burning. Despite the variability in lead emissions, the results of several studies indicate that many lead-cored wick candles do emit lead at rates greater than 430 µg/hour.

Some of the emitted lead may also deposit onto surfaces in the room. This deposited lead could remain accessible to a child for an extended period of time, where exposures could occur through direct mouthing of surfaces or objects or by hand-to-mouth contact.

The amount of lead emitted from lead-containing wicks during candle burning does not correlate well with the lead content of the wicks and therefore cannot be predicted by the

lead content. However, the lead emissions from some candles that used lead alloys in their wicks exceeded 430 µg/hr, the level that CPSC staff determined would cause excessive lead exposure in children. Because of the unpredictability of the actual lead emissions level from a given candle and the likelihood that children would be exposed in some circumstances to excessive lead emitted from lead-cored wick candles, the staff recommends a ban on lead-cored wicks.

Alternatives to use of lead alloys in candle wicks include zinc and tin alloys. These substitute alloys may contain unintentional trace amounts of lead. However, test data indicate that burning candles with metal-cored wicks with lead concentrations 0.06% or less by weight do not result in detectable air emissions. Accordingly, for purposes of this rulemaking, CPSC staff recommends that a lead-cored wick be defined as a wick containing a metal core with greater than 0.06% lead by weight in the metal.

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Appendix I

Indoor Air Model

IAQ Model, One Compartment

Source (µg/hr)	2200	
House Volume (m^3)	51	(15'x15'x8' room)
Air changes (per hour)	0.5	
Delta Time, hrs	0.25	
Blow out candles, hrs	4	

Time (hours)	Air concentration (µg/m^3)	Time (hours)	Air concentration (µg/m^3)	Time (hours)	Air concentration (µg/m^3)
0	0	8	10.095812	16	0.1849113
0.25	10.137522	8.25	8.9095232	16.25	0.1631836
0.5	19.083854	8.5	7.8626266	16.5	0.144009
0.75	26.978964	8.75	6.9387437	16.75	0.1270875
1	33.946374	9	6.1234198	17	0.1121543
1.25	40.095092	9.25	5.403899	17.25	0.0989759
1.5	45.521317	9.5	4.7689241	17.5	0.0873459
1.75	50.309943	9.75	4.2085608	17.75	0.0770825
2	54.535891	10	3.7140418	18	0.068025
2.25	58.265277	10.25	3.2776304	18.25	0.0600319
2.5	61.556449	10.5	2.8924987	18.5	0.052978
2.75	64.460898	10.75	2.5526211	18.75	0.0467529
3	67.024065	11	2.2526802	19	0.0412593
3.25	69.286052	11.25	1.9879833	19.25	0.0364112
3.5	71.282248	11.5	1.7543891	19.5	0.0321328
3.75	73.043885	11.75	1.548243	19.75	0.0283571
4	74.598525	12	1.3663196	20	0.025025
4.25	65.832967	12.25	1.2057728	20.25	0.0220845
4.5	58.097389	12.5	1.0640908	20.5	0.0194895
4.75	51.270766	12.75	0.9390568	20.75	0.0171994
5	45.246292	13	0.8287148	21	0.0151784
5.25	39.929713	13.25	0.7313382	21.25	0.0133949
5.5	35.237848	13.5	0.6454037	21.5	0.011821
5.75	31.097292	13.75	0.5695668	21.75	0.010432
6	27.443264	14	0.5026409	22	0.0092062
6.25	24.218595	14.25	0.443579	22.25	0.0081244
6.5	21.372835	14.5	0.3914571	22.5	0.0071698
6.75	18.861461	14.75	0.3454597	22.75	0.0063273
7	16.645181	15	0.3048671	23	0.0055838
7.25	14.68932	15.25	0.2690443	23.25	0.0049277
7.5	12.96328	15.5	0.2374308	23.5	0.0043487
7.75	11.440054	15.75	0.2095319	23.75	0.0038377
				24	0.0033868
				24 hr average:	14.230585

Calculations

During candle burning: $C=\frac{S}{aV}(1-e^{-at})$

where,

C = concentration of lead in air, $\mu g/m^3$

S = source strength, $\mu g/h$

a = air changes per hour, 1/h

t = time, h

V = room volume, m^3

After the candle is extinguished: $C=C_{off} * e^{-a(t-t_{off})}$

where,

C = concentration of lead in air, $\mu g/m^3$

C_{off} = concentration of lead in air at the time the candle is extinguished, $\mu g/m^3$

a = air changes per hour, 1/h

t = time, h

t_{off} = time the candle is extinguished, h

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: NOV 15 2000

TO : Mary Ann Danello, Ph.D., Associate Executive Director, Directorate for Health Sciences

THROUGH : Lori E. Saltzman, M.S., Director, Division of Health Sciences, Directorate for Health Sciences

FROM : Kristina M. Hatlelid, PhD., M.P.H., Toxicologist, Division of Health Sciences

SUBJECT : Review of Zinc and Tin Emissions from Metal-Cored Wick Candles

Introduction

Some candles available to consumers contain wicks with metal cores. The metal is intended to provide certain performance characteristics to the wick as the candle is made and as it burns. Some of these metal wicks contain zinc or tin, which can be released into the air during candle burning.

Zinc

Zinc (Zn) is ubiquitous in the environment. It is a component of numerous enzymes, including carbonic anhydrase, carboxypeptidase, alcohol dehydrogenase, alkaline phosphatase, and superoxide dismutase, and it is important in carbohydrate metabolism, vitamin homeostasis, and many other cell and organ systems (ATSDR, 1994). It is considered essential for all living things.

Foods contain from about 2 to 29 ppm zinc and the average daily intake of zinc in the U.S. ranges from 7 to 16.3 mg. Average air levels are generally below 1 $\mu g/m^3$ but may range up to 1.7 $\mu g/m^3$ near cities. Water levels may not exceed 5 mg/L (5 ppm) because of taste. The estimated Recommended Dietary Allowance (RDA) is about 0.21 mg/kg (ATSDR, 1994).

The Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) for zinc oxide (ZnO) is 5 mg/m^3 for fumes and the respirable fraction and 15 mg/m^3 for total dust

(doses and exposures are expressed in terms of zinc). The TLV-TWA (threshold limit value-time weighted average) established by the American Conference of Governmental Industrial Hygienists for ZnO is 5 mg/m^3 for fume and 10 mg/m^3 for respirable dust (ACGIH, 1991).

Tin

Tin is a naturally-occurring element in the environment in both inorganic and organic compounds. Levels of tin in most media are very low, often below the analytical detection limits. The average daily intake of tin in the U.S. is about 4 mg, mostly from food. Air and water contribute very little to this total (ATSDR, 1992). Tin is not essential to human health.

The OSHA PEL TWA and the ACGIH TLV-TWA for inorganic tin compounds and tin oxide is 2 mg/m^3 as tin (ACGIH, 1991).

Health Effects

Zinc

ZnO dust is generally considered a nuisance dust, but freshly generated ZnO fumes or ultrafine particles (0.2-1 µm) of ZnO are associated with metal fume fever. Ultrafine ZnO particles are formed by heating zinc beyond its boiling point in an oxidizing atmosphere. Metal fume fever is a brief, self-limited, occupational illness characterized by fever, chills, myalgias, vomiting, and malaise. It temporarily impairs lung function, but does not progress to chronic lung disease.

Experimental animal studies and occupational and experimental observations among humans indicated that acute exposure to ZnO fume or ultrafine particles at air levels from about 800 $\mu g/m^3$ to 600,000 $\mu g/m^3$ caused clinical symptoms of metal fume fever, lung function changes, and/or inflammation (Amdur *et al.*, 1982; Blanc *et al.*, 1991; Conner *et al.*, 1988; Gordon *et al.*, 1992; Lam *et al.*, 1985; Lam *et al.*, 1988; Marquart *et al.*, 1989; Sturgis *et al.*, 1927). No effects were observed among welders exposed to approximately 34 $\mu g/m^3$ for 6-8 hours/day (Marquart *et al.*, 1989).

Tin

The health effects of inhalation of inorganic tin, including tin oxide (SnO_2), are not well-documented. Exposure to dust or fumes of tin oxide or other inorganic tin compounds produces a benign pneumoconiosis (stannosis) in workers with

industrial exposures for 15-60 years. Although chest x-rays of workers exposed to tin oxide showed opaque shadows due to the deposited dust, there were no tissue reactions, and the workers experienced no impairment of pulmonary function or systemic disease. No exposure levels were included in the case reports (ATSDR, 1992).

There are no studies of inorganic tin inhalation in animals.

Analysis of Metal Emissions from Candles with Metal-Cored Wicks

Zinc

The CPSC Directorate for Laboratory Sciences Division of Chemistry (LSC) analyzed 23 candles with metal-cored wicks (CPSC, 2000). Inductively coupled plasma spectroscopy (ICP) was used to analyze the metal content of wicks after digestion in concentrated nitric acid. The emission of zinc during candle burning was determined using a small-chamber setup with a water-jacketed column gas scrubber packed with dilute nitric acid-wetted glass wool with subsequent analysis by ICP.

Eighteen of the metal cores contained greater than 99% zinc by weight. Small-chamber testing for zinc emissions during the burning of these candles resulted in zinc releases ranging from approximately 3 µg/hour to 2,700 µg/hour.

Nriagu and Kim (2000) tested several candles from the United States, Mexico, and China for zinc emissions when burned. They did not measure the zinc content of the wicks. Zinc releases from burning candles ranged from 1.2 to 124 µg/hour.

Tin

Although some candle wicks are produced with tin cores, no data on emissions from tin-containing wicks were available from CPSC analyses or other sources.

Exposure and Risk Analysis

Zinc

In a model room of 51 m^3 (15'x15'x8') with 0.5 air changes per hour, a candle burning for four hours, emitting 2,700 µg zinc per hour, air zinc levels would reach a peak of 94 $\mu g/m^3$. After the candle is extinguished, the zinc air level in the room would fall rapidly within a few hours. The 24-hour average zinc

concentration for a room under these conditions would be about 17.5 $\mu g/m^3$.

Although the amount of zinc emitted from burning candles has been determined for a number of candle samples, no data currently exist that characterize physical and chemical properties of those emissions. The ability of zinc to cause adverse health effects depends on the chemical compound, particle size, and other physical properties that govern respirability and reactivity within the lung. Intense exposures to zinc oxide fumes have been associated with the syndrome metal fume fever in zinc welders and smelters. However, the likelihood or extent to which metal fume fever can be caused by exposure to zinc released from burning candles is unknown, since the characteristics of the zinc emissions are not known. Further, although zinc releases have been measured from burning zinc-cored wick candles, the levels were lower than the levels observed to cause illness in humans or experimental animals exposed to zinc fume or dust.

Tin

Among workers exposed to tin compounds, chest x-rays showed opaque shadows due to the deposited dust, but there were no tissue reactions, and the workers experienced no impairment of pulmonary function or systemic disease. The long-term exposures to high levels of dust experienced by workers are not expected for consumers who burn candles.

Conclusions

The staff has no basis to believe that zinc or tin emissions from burning candles with metal-cored wicks represent a hazardous exposure to these metals.

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TAB C

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: October 18, 2000

TO : Kristina Hatlelid, Ph.D., M.P.H., Directorate for Health Sciences

THROUGH: Jacqueline Elder, Deputy Assistant Executive Director
Office of Hazard Identification and Reduction
Robert B. Ochsman, Ph.D, Division Director, Human Factors

FROM : Carolyn Meiers, Engineering Psychologist, Human Factors

SUBJECT : Labeling of Candles With Lead-Cored Wicks (Petition HP-00-3)

This memorandum discusses whether labeling of candles with lead-cored wicks is an acceptable alternative to a ban of candles with wicks that contain lead.

BACKGROUND

The U.S. Consumer Product Safety Commission was petitioned to ban candle wicks that contain lead (Petition HP-00-3). The petitioner contended the following: 1) as the wicks burn, some of the lead vaporizes and is released into the air, 2) this airborne lead may be inhaled, 3) some of the lead may deposit on floors, furniture and other surfaces in the room, 4) children can ingest these deposits by touching the surfaces and mouthing their fingers, and 5) fetuses, infants, and young children are the populations most at risk for lead poisoning from these wicks.

DISCUSSION

The following section discusses the various hazard prevention strategies and their effectiveness in addressing the potential lead poisoning hazard associated with lead-cored wicks in candles.

Hazard Prevention Strategies

There are four strategies to use to safeguard against product-related hazards. In order of effectiveness, they are as follows:

1) Design the hazard out of the product,
2) Guard against the hazard,
3) Train users to avoid the hazard, and
4) Warn (label) against the hazard.

The objective of the approaches is to reduce or eliminate injuries and deaths caused by hazardous situations. Designing the hazard out of a product is the preferred approach. Design focuses on

modifying the product. Warnings focus on modifying the behavior of individuals. Warnings are, therefore, the least effective safety strategy because their efficacy is susceptible to complex psychological, behavioral and situational variables that involve interactions of the consumer, the product, and the environment in which the product is used.

A Human Factors analysis can determine which strategy is appropriate for a particular circumstance. If a determination is made to use a warning label, an analysis can provide critical insights to the content of the safety message. A potentially effective safety message must identify the hazard, tell consumers what they have to do to avoid the hazard, and state the consequences consumers face if the safety precautions are avoided.

After analyzing the issues associated with consumer behavior and use of candles, Human Factors determined that guarding and training strategies are not applicable to this situation and that warning labels would not be effective in protecting consumers against the potential lead poisoning hazard. The issue of warning effectiveness is more fully discussed in the following section.

Warning Effectiveness

The only preventative measures consumers can take to protect themselves against this hazard is to not burn candles with lead-cored wicks and only use them for decorative purposes. The warning label would have to advise consumers not to burn the candle, in which case the candle could not be used for its intended purpose. A warning label could advise consumers to use the candle only for decorative purposes, but it is unrealistic to expect compliance with this measure.

One purpose of labels is to act as reminders. This would be the function of a label that informed consumers to use the candle for decorative purposes only. To be effective in this capacity the label would have to be in view at all times. Consumers are motivated to purchase candles because they add beauty and atmosphere to their homes. A permanent, conspicuous label on a candle would affect consumer acceptance of this product.

In addition, the space and location limitations on candles prohibit placement of a conspicuous label. This is particularly true for taper candles that are sold individually. These candles are tall and slender. They do not have sufficient surface area or packaging materials suitable for label placement. Labels on larger candles are located on the bottom, out of sight of consumers. The text is generally small and difficult to read. The candle has to be turned upside down for the label to be seen. Once the candle is placed in the household, these labels will not be read or referenced.

If labels are placed on outer packaging they may be read when the candle is initially purchased but would be discarded when the candles are unwrapped. Without a label, individuals other than the initial user who have access to the candle would not be aware of the hazard. Lead-cored wicks can only be identified through testing. A consumer cannot tell from the outward appearance of the wicks if lead is present.

Voluntary standards for candles require them to carry a warning label about fire hazards, and allow manufactures to add additional care and instruction messages. Requiring another label on candles could lead to overloading and the creation of "visual noise" that would diminish the presence of critical safety messages. Candles are familiar products that are frequently used in the home. Consumers' perceptions would be that they are already aware of candle safety issues and they likely would not be motivated to seek out additional safety messages from among the various labels.

CONCLUSION

Human Factors staff finds that a warning label would not reduce or eliminate the potential hazard of lead poisoning from lead-corded candle wicks. Other alternatives to lead-cord wicks are available and are currently being used by the candle industry. These design modifications to candle wicks would assure that consumers are automatically protected from a lead poisoning hazard.

TAB D

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: November 14, 2000

TO : Kristina Hatelid, Project Manager, Lead Candle Wick Petition

THROUGH: Warren J. Prunella, AED, EC

FROM : Mary F. Donaldson, EC

SUBJECT : Lead Candle Wick Petition, HP-00-3

The Consumer Product Safety Commission is considering a petition from Public Citizen, the National Apartment Association and the National Multi-Housing Council for a ban of candles with lead-containing wicks and wicks sold for candle-making that contain lead. This memo presents an overview of available information about the market for candle wicks and candles.

Description

Candles

Candles are made using fuels such as paraffin wax, beeswax, or gelled mineral oil to which a wick is added. Frequently added ingredients include fragrance and color.

There are two major types of candles: *container* and *freestanding*. Candles which are fabricated and burned in glass, ceramic or other non-flammable materials are referred to as *container (or filled)* candles. Tealights and devotional candles are examples of container candles. Candles that are rigid and used on a non-flammable candleholder are called *freestanding* candles. Freestanding candles include tapers and pillars. Examples of different types of candles are shown at the end of this report.

Candle Wicks

A candle wick is "a cord or strand of loosely woven, twisted or braided fibers...that draws up fuel to the flame by capillary action" (7). Manufactured candle wicks are predominantly braided and are made with industrial braiding machines. These machines are also used to produce other narrow fabrics such as rope, window cords, and braided trims.

There are three general types of candle wicks. The first, which makes up about 50 percent of U.S. wick production, is the *flat braided* wick. Flat braided wicks are used typically in taper candles and are made of cotton fiber (8).

A second type of wick is the *square* wick, representing less than 10% of U.S. production. This type of wick is also made of fiber such as cotton and typically is used by manufacturers of beeswax candles and candles that develop small wax pools when burning (8).

A third type of candle wick is the *cored* wick, which may account for about 40% of wicks used in candles. Cored wicks are rigid and have a central core made of cotton, paper, metal or sometimes polypropylene. The cores are surrounded by wicking material made of paper or fiber. The central cores provide the necessary rigidity to wicks in candles that produce deep pools of molten wax. These are frequently used in votives, pillars, tealights and other container candles (8, 12).

When wires are used in candle wick cores, they may be made of zinc, tin or lead. According to Atkins & Pearce, the leading producer of candle wicks in the U.S., about 20% of their wicks use either a zinc or tin core[1]. The rest of their wicks are constructed with cotton or cotton and paper. Prior to ceasing the production of lead cores in 1998, about 1% of the Atkins & Pearce wicks produced during the 1990's had lead cores (8).

Although not made of lead, zinc and tin core wicks may contain trace amounts of lead as contaminants. The higher the purity level of the zinc or tin wire used, the lower the level of impurities such as lead. According to Atkins & Pearce, they do not order their metal wire for cores by purity or grade. However, their zinc wire cores contain about .004 percent lead and their tin wire cores are about .08 percent lead (18).

According to information provided by the Petitioner, candle wicks with some levels of detectable lead currently are found in the marketplace. In a non-statistical survey of candles for sale in the Washington, D.C. area in 1999, the Petitioners found that about 30% of candles for sale had metal core wicks. About 10 % of the metal core wicks (or 3% of all candles) had detectable levels (i.e., at least trace levels) of lead in the wick (16).

Trade Associations and Standards

The major trade association, which represents candle and wick manufactures and other candle material suppliers, is the *National Candle Association (NCA)*. NCA members include about 70 candle manufacturers, nine of which are foreign, and produce about 80% of the U.S. domestic shipments of candles. Another US based organization, comprised of craftspersons, is *The International Guild of Candle Artisans*, with 800 members from around the world. Based in France is the *Association of European Candle Manufacturers (AECM)*, which represents 13 European manufactures (6).

There is an ASTM standard for candles that addresses fire hazards. However, there are no U.S. standards currently in place that address the issue raised by the petitioners.

[1] Atkins & Pearce has ceased, as of this writing, producing candle wicks with tin cores.

Manufacturers

Candle Manufacturers

The precise number of candle manufacturers is unknown. The National Candle Association, and the U.S. International Trade Commission, state that there are over 200 commercial, institutional and religious manufacturers of candles in the U.S., as well as many small producers of candles (4). The InfoUSA database of U.S. manufacturers lists 355 companies as "candle manufacturers."

Most candle companies are small businesses. Of the 355 firms identified as candle manufacturers by InfoUSA, all but two firms had fewer than 500 employees, the U.S. Small Business Administration's threshold for defining a candle manufacturing business as small. Most firms were much smaller than the threshold limit. In fact, 188 (or 53%) had fewer than 5 employees (14, 15). Since start up expenses are small, producers of candles may enter and exit the market easily and frequently. Also, small candle manufacturers may not be active in trade associations and may not be aware of applicable standards.

Wick Manufacturers

Three domestic producers of candle wicks have been identified. The leading producer, Atkins and Pearce, accounts for the majority of candle wicks used by the U.S. candle industry (8). The other two domestic producers are Wicks Unlimited, Inc. and Candlewic. Additionally, three foreign wick producers are members of the NCA; two are based in Germany and one in Brazil.

Candle wick manufacturers sell their products to either wholesalers (candle material suppliers) or large candle manufacturers. The InfoUSA database lists 85 wholesale suppliers of candle making materials (14). Small candle producers usually purchase wick material from the wholesale firms.

Although metal cored wicks may contain lead as a contaminant, there are no known U.S. wick *manufacturers* that currently use lead wire in their candle wicks. The candle material supply firm mentioned by the Petitioner, Candlechem Co. Inc., is no longer offering lead wicks for sale over the Internet.

Sales, Pricing, & Marketing

Candles

Retail sales and shipments of candles have increased substantially in recent years. In 1998, sales were around $1.5 billion. By 1999, sales rose to $2.3 billion and are projected to rise to about $3.2 billion in 2001, a doubling in sales from 1998 levels. Retail prices of candles range from about 10 cents for a small tealight candle up to $75.00 for large columnar candles (3,11).

Candles are marketed to consumers and to commercial and institutional establishments such as restaurants and religious organizations. They are sold through grocery, discount, and department stores, mass merchandise retailers, specialty and gift shops, craft stores, catalogs, the Internet, and through direct sales at in-home shows (1). In recent years, several chains of candle stores have become established nationwide. They include Illuminations, Yankee Candle and White Barn Candle Company (17).

Several trends have contributed to the current year-round popularity of candles and the subsequent decline in the historically strong seasonality of candle sales. One is the increasing popularity of using candles to scent the home. According to a recent article in *Forbes*, scented candles currently represent 72 % of industry sales (9). In 1992, 40 million scented candles were sold. By 1997, sales of scented candles increased to about 700 million (17). In recent years, candles also have been used increasingly for decorating and aromatherapy (3).

Wicks

Candle wicks may be purchased at craft stores in small quantities. In large quantities, they may be purchased from wholesale firms or direct from the manufacturers. Candle wicks are available on reels or precut to desired lengths. Prices vary depending upon how the wick is supplied and the quantities ordered. For example, based on one manufacturer's list prices, pre-waxed wicks on reels were 12 cents per yard and pre-waxed, pre-cut, 2-inch wicks were 37 cents per yard. For this manufacturer, the price did not depend on wick type (19).

Factory Shipments and International Trade

Candles

Table 1 (see appendix) provides the dollar value of domestic factory shipments of candles obtained from the U.S. Census Bureau's *Census of Manufactures*. In 1997, the most recent year available, U.S. domestic candle shipments amounted to about $951 million. This is about 150 percent more than the 1992 shipments of $366 million.

Table 2 shows customs value of U.S. imports and exports of candles by year. In 1999, U.S. imports amounted to $484 million, an increase of over 800% since 1992. Imports from the Far East accounted for almost half of the imports, while imports from the Americas, mostly Canada and Mexico accounted for a little more than one third. Imports from European countries and Great Britain accounted for less than 10 percent of imports. (See table 3.)

Currently, the International Trade Commission (ITC) is imposing an antidumping duty order on candles from the Peoples Republic of China. The ITC believes that imports from China would increase significantly, if the antidumping order were revoked (4).

U.S. exports of candles amounted to about $72.6 million in 1999. (See tables 2 and 4.) This represents an increase of more than 600 % since 1992 when candle exports were about $10 million. Canada receives most of the U.S. candle exports. In 1999, the value of U.S. candle exports to Canada was $48.5 million or 67% of all U.S. candle exports. The only other countries

receiving more than $1 million value of U.S. candles in 1999 were: United Kingdom, Mexico, Netherlands, Germany, Australia, and Spain.

In 1997, the year for which domestic shipment data were available, the apparent U.S. consumption of candles (domestic shipments + imports - exports) was about $1.1 billion.

Candle Wicks

No specific information is available on domestic shipments or sales of candle wicks. Candle wicks are classified as part of the U.S. Census Bureau's textile category, "narrow fabric mill products." Shipment data for narrow fabric mill products include a large variety of disparate products such as window blind cords, rope and decorative trims. Therefore, reporting shipments would not reveal relevant information.

Information on international trade of "textile wicks, woven, plaited or knitted, for lamps, stoves, lighters, candles, etc." is reported under SITC code 65772. Tables 5 & 6 (see appendix) provide information on the value of imports, exports and origin of imports of textile wicks. Total customs value for 1999 was about $3.9 million. The primary countries of origin were, in order of customs value, United Kingdom, Germany, Costa Rica, India, and Malta.

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15. *Business Credit and Assistance*, Title 13, Code of Federal Regulations.

16. *Petition to the U.S. Consumer Product Safety Commission*, February 24, 2000 from Public Citizen.

17. *The Beauty Report*: *Candle Category Burns Bright, WWD*, Friday February 5, 1999, p. 6.

18. Email message from Atkins & Pearce, Inc. to CPSC, February 28, 2000.

19. Wicks Unlimited Web Site, www.wicksunlimited.com, April 3, 2000.

Appendix

Table 1: Domestic Factory Shipments of Candles, 1977-1997.

Year	Value of Shipments (in $ millions)
1977	160.3
1982	257.6
1987	202.1
1992	366.2
1997	950.6

Source: U.S. Bureau of the Census

Table 2: Customs Value of Candle Imports, FAS[1] Value of Exports, 1992-1999.

Year	Value of Imports (in millions)	Value of Exports (in millions)
1992	53.2	9.9
1993	67.8	14.2
1994	95.3	21.7
1995	135.7	31.2
1996	197.8	49.9
1997	226.7	66.5
1998	341.6	68.6
1999	484.2	72.6

[1] *Free alongside ship (FAS) value is the value of exports at the U.S. port.*
Source: United States International Trade Commission

Table 3: Customs Value of Candle Imports, by Country of Origin, 1999.

Country of Origin	Customs Value ($ Millions)
China	131.7
Canada	73.7
Guatemala	55.7
Hong Kong	53.5
Mexico	50.9
Israel	19.4
Thailand	18.4
Taiwan	17.5
Italy	13.2
France	4.6
Macao	4.5
Germany	4.4
United Kingdom	4.4
Denmark	4.0
Netherlands	3.8
Korea	3.5
El Salvador	3.3
Portugal	2.7
India	2.0
Philippines	2.0
Malaysia	1.7
Spain	1.0
Swaziland	1.0
Others	7.3
Total	**484.2**

Source: United States International Trade Commission

Table 4: FAS Value of U.S. Candle Exports by Receiving Country, 1999.

Country	Value of Exports (in $ millions)
Canada	48.5
U.K.	8.8
Mexico	2.4
Netherlands	2.3
Germany	1.8
Australia	1.5
Spain	1.0
All Other Countries[2]	6.3
Total	**72.6**

[2] *All other countries receiving less than $1 million in U.S. candle exports*

Source: United States International Trade Commission

Table 5: Customs Value of Textile Wick Imports & FAS Value of Exports, 1992-1999.

Year	Value of Imports (in $ millions)	Value of Exports (in $ millions)
1992	1.4	5.3
1993	1.6	3.6
1994	2.8	3.6
1995	2.8	3.3
1996	3.4	4.0
1997	3.7	3.6
1998	3.0	4.9
1999	3.9	5.4

Source: United States International Trade Commission

Table 6: Customs Value of Textile Wick Imports, by Country of Origin, 1999.

Country of Origin	Value of Imports 1999 ($ 1,000's)
United Kingdom	969
Germany	652
Costa Rica	531
India	486
Malta & Gozo	461
Japan	166
China	124
Canada	109
Korea	90
Taiwan	65
Mexico	34
Israel	32
Philippines	30
Ireland	24
Netherlands	20
Dominican Republic	12
Indonesia	12
Austria	10
France	9
Czech Republic	7
Italy	7
Hong Kong	5
Switzerland	4
Poland	3
Sweden	3
Greece	2
Venezuela	1
Total	**3,865**

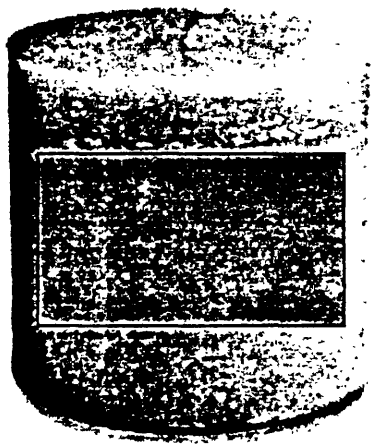
Source: United States International Trade Commission
Note: Results may not add due to rounding.

Examples of Types of Candles

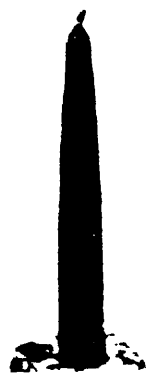
Tealight Candles

Votive Candle

Box of Tealight Candles



Pillar Candle



Taper Candle

TAB E

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: NOV 15 2000

TO : Mary Ann Danello, Ph.D., Associate Executive Director, Directorate for Health Sciences

THROUGH : Lori E. Saltzman, M.S., Director, Division of Health Sciences, Directorate for Health Sciences

FROM : Kristina M. Hatlelid, Ph.D., M.P.H., Toxicologist, Directorate for Health Sciences

SUBJECT : Response to Public Comments for Petition HP 00-3 to Ban Lead-cored candle wicks

Introduction

The U.S. Consumer Product Safety Commission (CPSC) received public comments and information from 142 consumers and organizations in response to the Federal Register Notice for the Petition HP 00-3, requesting a ban of candle wicks containing lead and of candles containing such wicks (65 FR 19742, April 12, 2000). This memo provides a summary of those submissions and the staff's responses to them. Similar or related comments are addressed together under a single issue category. The index of the public comments is in Tab F.

The public comment period closed on June 12, 2000. The Commission received 142 comments on Petition HP 00-3. All but one of the comments received supported the petition's request for a ban, asked for the removal of lead from candles or candle wicks, and/or expressed concern about the health effects of lead. The single dissenting comment from a consumer simply stated opposition to the petition.

After the comment period closed, the Commission received several additional comments in support of the petition's request for a ban of lead-containing candle wicks. The Natural Resources Defense Council reiterated the positions of the petitioners and supported a mandatory ban of lead-cored wicks. The National Candle Association stated their commitment to remove lead-cored wicks from the market and agreed to support development of a mandatory ban if the Commission grants the petition. Voices of

Safety International submitted a proposal for a standard that would ban metal-cored wicks.

The majority of commenters are private citizens who do not represent any particular non-profit organization or industry group. Many were responding to an e-mail/webpage request by a consumer to write to the Commission in support of the petition. About 25% of the commenters are health professionals (physicians, environmental health specialists, chemists, *etc.*). Additional data or substantive discussion of the issues were provided by less than 5% of the commenters.

Discussion

Issue: A federal law is needed to ban the use of lead in candles. The 1974 voluntary agreement with the industry has not proven effective. Manufacturers have ignored the "voluntary ban."

More than one in five commenters, representing both public health professionals and private citizens, reiterated the position of the petitioners that the voluntary agreement drafted by the industry in 1974 did not effectively stop the manufacture or sale of lead-cored wicks in the U.S.

Response:

The staff agrees with the commenters that the industry did not adhere to the voluntary agreement since some U.S. wick and candle manufacturers did produce lead-cored wicks or candles containing lead-cored wicks after 1974.

The staff believes that a mandatory standard is necessary, in part because of the failure of the industry to maintain conformance with the voluntary agreement.

Issue: The ASTM process is not the proper venue to ensure immediate protection of human health. The CPSC should not delegate its responsibility for addressing the issue to the ASTM. Even if ASTM enacts a voluntary standard, such a standard should not be an excuse for inaction by the CPSC. CPSC must aggressively enforce the ban.

Co-petitioners National Apartment Association and National Multi Housing Council (4, 112) believe the ASTM standards process is too slow to address the potential for adverse health effects from lead exposure from lead-cored wick candles. They also do not believe the industry-dominated task group is able to

establish an appropriate health-protective standard. The Alliance to End Childhood Lead Poisoning (11), a non-profit organization, questions whether the ASTM can adopt a standard that would be protective of health and that would be widely recognized and enforceable.

Response:

If the Commission proceeds to issue a mandatory ban on lead-cored wicks in candles, and an applicable voluntary standard has been adopted and implemented, the Commission could not issue the ban unless it found either that compliance with the voluntary standard would not adequately reduce the risk or that it is unlikely that there will be substantial compliance with the voluntary standard. 15 U.S.C. § 1262(I)(2)(A).

Currently, there are no applicable standards in place that address the lead content of candle wicks. In May 2000, a task group for candle wicks was formed under the ASTM F15.45 Candle Products subcommittee to develop a standard to address the lead content of lead in candle wicks. The task group is in the process of developing a standard for lead content of metal-cored wicks. The first step in this process is to draft a standard and present it to the subcommittee for consideration. The subcommittee is scheduled to meet during fall 2000.

The staff believes that a mandatory standard is needed. A mandatory standard would 1) apply to all domestic and imported candle and wick products regardless of a company's membership in a trade organization or knowledge of ASTM standards (*e.g.*, small businesses); 2) deter manufacturers from making non-conforming wicks or candles and enable the staff to seek civil penalties for violations; 3) increase compliance by retailers and distributors who often require that products meet applicable federal standards; and 4) prevent non-complying products from entering the U.S. through cooperative efforts with the U.S. Customs Service.

Issue: The CPSC should recall candles with lead wicks.

About one in five commenters, mostly private citizens, reiterated the request of the petitioners for a recall of candles with lead-cored wicks.

Response:

The recall requested by Public Citizen would not require rulemaking to implement. Therefore, the Commission's procedural

rules for petitions, at 16 C.F.R. § 1051, do not apply to that request, and the request for recalls was not docketed as part of the petition.

The request for recalls may be considered separately by the Office of Compliance.

Issue: The health effects of exposure to lead are well known. The use of lead in candles is unnecessary. The potential for harm from lead in candles is obvious.

The harmful effects of lead exposure in children were reiterated by a number of commenters, including Harvard Associate Professor of Occupational Medicine, Howard Hu, M.D., M.P.H., Sc.D., and Tulane Associate Professor of Environmental Health Sciences, Charles A. Miller, III, Ph.D. (3, 32).

Several commenters emphasized that lead is not a necessary component of candles and that the use of lead in candle wicks may lead to a hazardous lead exposure from burning them (53, 67, 72, 82, 86, 116, 124, 133, 137, 138, 142).

Response:

The adverse health effects of lead exposure in children are well-documented and may have long-lasting or permanent consequences. These effects include neurological damage, delayed mental and physical development, attention and learning deficiencies, and hearing problems. Because lead accumulates in the body, even exposures to small amounts of lead can contribute to the overall level of lead in the blood and to the subsequent risk of adverse health effects. The scientific community generally recognizes a level of 10 micrograms of lead per deciliter of blood (10 μg/dL) as a threshold level of concern with respect to lead poisoning. To avoid exceeding that level, young children should not chronically ingest more than 15 micrograms of lead per day (15 μg/day) from consumer products. The staff uses 15 to 30 days to represent a chronic exposure time period.

The staff analysis (Tab B) indicates that exposure to lead emissions from candles above about 430 μg/hour under certain conditions contributes to excess lead exposure equivalent to the 15 μg/day threshold of concern.

Candles with lead-containing wicks analyzed by CPSC and other researchers emitted lead up to 2,200 μg/hour during

burning. Thus, lead-containing candles do have the potential to harm consumers from excess lead exposure.

Further, since most candles do not contain lead-cored wicks, the staff believes that the use of lead in candle wicks is not required for wick or candle manufacture (Tab D).

Issue: Candles are/are not necessary.

While several commenters claim that candles are simply decorative or a luxury item and are not necessary to own or use, at least one citizen emphasized that in rural areas with frequent power outages, candles are a necessity (4, 9, 41).

Response:

The staff acknowledges that candles may be required consumer products in some households. The staff also believes that consumers purchase and use candles for many reasons. The likelihood that a particular lead-cored wick candle will cause excessive lead exposure to consumers does not depend on the circumstances of its purchase.

Staff analysis (Tab C) shows that 1) the only action a consumer can take to prevent the release of lead into the air from a lead-cored wick candle is to not burn the candle, 2) the candle cannot be used for its intended purpose if it cannot be burned, and 3) it is not realistic to expect a candle to be used only for decorative purposes and not be lit.

Since candles are purchased and burned by consumers for a variety of reasons, and since lead-cored wick candles have been shown to present a risk to consumers from exposure through inhalation of airborne lead, the staff recommends that the lead content of wicks be minimized as much as technologically feasible. Studies by CPSC and others showed that some metals (zinc and tin) used in candles contain trace amounts of lead. However, test data indicate that burning candles with metal-cored wicks with lead concentrations 0.06% or less by weight do not result in detectable air emissions. These experimentally undetectable releases of lead are unlikely to contribute hazardous levels of lead to children breathing the air or in contact with surfaces. Therefore, the staff recommends that metal-cored wicks contain no more than 0.06% lead by weight in the metal (Tab B).

Issue: Substitute materials are available and should be explored. Some alternatives to metal wicks perform better. The societal costs of lead poisoning outweigh the minimal cost of using alternatives to lead. Other countries have acted to eliminate lead-cored wicks.

Several commenters presented these arguments in support of a ban on lead-cored wicks (10, 27, 29, 34, 123, 133, 139, 142). They claim that many wick manufacturers produce wicks without using lead and that many candle makers produce candles that do not use lead-cored wicks. Since many candles are available that do not use lead-cored wicks, candles, in general, do not require these wicks.

Several commenters argue that since the adverse effects of lead exposure in children are well-known and can be permanent and severe, any costs associated with using different wicks must be small in comparison to the effects of lead exposure.

At least one commenter pointed out that other countries have issued notices that ban the import and sale of lead-containing wicks.

Response:

The economic information developed by CPSC staff (Tab D) supports the claim that alternatives to the use of lead core are available. In fact, none of the three wick manufacturers in the U.S. currently use lead core in the production of their wicks. At the May 5, 2000 meeting of the ASTM task group for wicks (under the ASTM F15.45 Candle Products subcommittee), a representative of a European wick manufacturer stated that lead-cored wicks are not used in Europe.

Other countries have acted to eliminate lead-cored wicks. In September 1999, the Minister for Financial Services and Regulation of Australia banned the sale of candles with wicks that contain lead under the Trade Practices Act. The ban remains in effect for 18 months unless revoked before the end of that time or otherwise made the subject of a permanent ban. In June 2000, the Minister of Consumer Affairs in New Zealand issued a similar order that bans the sale or importation of candles with lead in their wicks under the Fair Trading Act. This order also is in effect for 18 months unless a further order is made.

Although the costs associated with exposure to lead from lead-cored wick candles are not known, the effects of lead exposure in children are well-known and do carry significant

societal costs in terms of health care, neurological damage, delayed mental and physical development, attention and learning deficiencies, and hearing problems.

From the available data, CPSC staff does not anticipate that using non-lead materials in wicks would result in increased costs to manufacturers or consumers since most companies already use non-lead materials.

Issue: No lead should be allowed in wicks or candles. Candles with any detectable amount of lead should be banned. Metal wicks should be banned.

A number of commenters believe that no lead exposure from candles or any consumer product should be allowed (15, 16, 18, 26, 31, 39, 107, 112, 133). Since metals, such as zinc and tin, used as wick core may contain lead, these commenters believe that all metal cored-wicks should be banned.

Response:

The staff agrees that lead may be a contaminant of metals used as wick cores. The lead content of zinc and tin core has been determined by CPSC and others to range from about 0.0005% to 0.06% by weight in the metal (Tab B).

CPSC regulation of wicks and candles under the Federal Hazardous Substances Act (FHSA) requires that these products meet the definition of a hazardous substance. The definition requires both that the products contain lead and that they expose children to hazardous quantities of lead under reasonably foreseeable conditions of handling or use.

The scientific community generally recognizes a level of 10 μg/dL as a threshold level of concern with respect to lead poisoning. To avoid exceeding that level, CPSC staff believes that young children should not chronically ingest more than 15 μg/day from a consumer product. While exposures to small amounts of lead may add to the overall risk of lead poisoning, products that contribute less than 15 μg/day would not be considered, by themselves, to represent a hazardous exposure and would not meet the definition of a hazardous substance.

Studies by CPSC and others showed that lead releases from burning candles with zinc- or tin-cored wicks were undetectable under the experimental conditions (Tab B). Although the staff believes that the lead content of wicks should be minimized as much as technologically feasible, the very small amounts of lead

(*i.e.*, 0.06% or less) in the wicks are unlikely to contribute hazardous levels of lead in children breathing the air or in contact with surfaces. Thus, these products would not meet the definition of a hazardous substance under the FHSA, and could not be subject to a ban under the Act.

Issue: The ASTM proposed lead limit of 0.1% is too high. An acceptable maximum lead level would be 0.01% or 0.005%.

Several commenters, including the petitioner Public Citizen, observed that while it would be most desirable for candle wicks to contain no lead at all, it would be acceptable to allow the use of high grade metals with very small levels of lead contamination (11, 28, 119, 130, 132).

Response:

A task group for candle wicks was formed under the ASTM F15.45 Candle Products subcommittee to develop a standard to address the lead content of lead in candle wicks. The task group is in the process of developing a standard for lead content of metal-cored wicks. The staff is aware that the group has not finalized their proposal and is currently considering a maximum lead level of 0.02%.

Studies by CPSC and others showed that lead releases from zinc and tin wick core containing 0.0005% to 0.06% lead by weight were undetectable under the experimental conditions (Tab B). Although the staff believes that the lead content of wicks should be minimized as much as technologically feasible, the very small amounts of lead in metal wicks are unlikely to contribute hazardous levels of lead in children.

Issue: The CPSC should warn consumers of the dangers from exposure to metals released from burning candles with metal cores such as zinc or tin.

Two commenters believe that consumers should be warned about the potential dangers from exposure to metals such as zinc or tin (117, 141).

Response:

The staff has evaluated the releases and toxicity associated with metal-cored wicks containing zinc or tin (Tab B).

Intense exposures to zinc oxide fumes have been associated with the self-limiting syndrome, metal fume fever, in zinc welders and smelters. However, the likelihood or extent to which metal fume fever can be caused by exposure to zinc released from burning candles is unknown, since the characteristics of the zinc emissions from candles are not known. Further, although zinc releases have been measured from burning zinc-cored wick candles, the levels are lower than the levels observed to cause illness in humans or experimental animals exposed to zinc fume or dust.

Among workers exposed to tin compounds, chest x-rays showed opaque shadows due to the deposited dust, but there were no tissue reactions, and the workers experienced no impairment of pulmonary function or systemic disease. The long-term exposures to high levels of tin dust experienced by workers are not expected for consumers who burn candles.

Therefore, the staff has no basis to require warnings for consumers or to recommend against the use of zinc or tin in candle wicks.

Issue: If a ban cannot be achieved immediately, manufacturers should be required to label candles that have lead.

Four commenters believe that if lead-cored wicks or candles containing lead cores cannot be banned immediately, consumers should be warned that the product contains lead (17, 74, 97, 136).

Response:

Staff analysis showed that since lead is emitted from a candle when the wick is lit, no label or subsequent action by the consumer would prevent the release of lead into the air when the candle is used as intended. Further, it is not realistic to expect a candle to be used for decorative purposes only and not be lit (Tab C).

The staff believes that lead-cored wicks and candles containing lead-cored wicks should be banned and that labeling is not an acceptable strategy for protecting vulnerable populations from lead poisoning that may be induced by burning candles with lead-cored wicks.

Conclusions

The commenters focused on several issues regarding the use of lead-cored wicks in candles. Many comments focused on the need for a federal law and the health effects of exposure to lead and expressed concern over the lack of effectiveness of the 1974 voluntary agreement by industry to not use lead in its candle wicks. Some commented that a voluntary standard was not the appropriate means to ensure protection against lead poisoning. Several comments discussed the possibility of a limit for lead in candle wicks and the use of alternatives to lead. There was general agreement that lead should not be used in candle wicks.

The staff agrees with many of the commenters' positions. The staff agrees that exposure to lead from consumer products should be minimized and that alternatives to the use of lead core are available. In fact, none of the three wick manufacturers in the U.S. currently use lead core in the production of their wicks. Some wick manufacturers in other countries have stated they do not use lead cores and Australia and New Zealand have acted to ban the sale or import of lead-core wick candles within their countries. The staff also believes that a mandatory standard is necessary, in part, because of the failure of the industry to maintain conformance with a prior voluntary agreement, and because many manufacturers are small businesses that may not be members of ASTM and may be unaware of applicable standards.

On the other hand, the staff does not agree with commenters that any detectable lead must be banned from candles. Rather, the staff believes that a maximum lead level in metal-cored wicks of 0.06% by weight is an appropriate limit. Test data indicate that burning candles with metal-cored wicks with lead concentrations of 0.06% or less by weight do not result in detectable air emissions. These experimentally undetectable releases of lead are unlikely to contribute hazardous levels of lead to children breathing the air or in contact with surfaces.

The staff also has no basis to believe that zinc or tin emissions from metal-cored wicks represent a hazardous exposure to these metals.

TAB F

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

CPSA 6 (b)(1) Cleared 6/5/00
No Mfrs/PrvtLblrs or Products Identified
Excepted by
Firms Notified,
Comments Processed.

MEMORANDUM

DATE : June 12, 2000

TO : HS

Through: Sadye E. Dunn, Secretary

FROM : Martha Kosh

SUBJECT: Petition HP 00-3 Requesting a Ban of Candle Wicks Containing Lead and of Candles Containing Such Wicks

ATTACHED ARE COMMENTS ON THE CH 00-3

COMMENT	DATE	SIGNED BY	AFFILIATION
CH 00-3-1	4/12/00	Marianne Cline	1102 Coventry Dr. Thousand Oaks, CA 91360
CH 00-3-2	3/09/00	Russell Train	World Wildlife Fund 1250 24th St, NW Washington, DC 20037
CH 00-3-3	3/15/00	Howard Hu MD,MPH, Sc.D Assoc Professor Of Occupational Health	Harvard School of Public Health 665 Huntington Ave Boston, MA 02115
CH 00-3-4	5/24/00	Eileen Lee Ph.D Vice President Of Enviroment	National Multi Housing Council National Apartment Association Suite 540 1850 M St. NW Washington, DC 20036
CH 00-3-5	5/27/00	Ruby Two	ruby2_57@yahoo.com
CH 00-3-6	6/01/00	Ron Holmes	chinadoc@jps.net
CH 00-3-7	6/01/00	Don Paladin	DonPaladin@aol.com
CH 00-3-8	6/01/00	Eagle Nest	airc0mbat0@hotmail.com

Petition HP 00-3 Requesting a Ban of Candle Wicks Containing Lead and of Candles Containing Such Wicks

CH 00-3-9	6/05/00	J.D. Jackson	Shammahs.bean.field@htcomp.net
CH 00-3-10	6/05/00	Alison Stewart	torquill@foogod.com
CH-00-3-11	6/12/00	Don Ryan Exe. Director	Alliance to End Childhood Lead Poisoning 227 Massachusetts Ave, NE, Suite 200 Washington, DC 20002
CH 00-3-12	6/06/00	Nancy Anderson	nla@mint.net
CH 00-3-13	6/06/00	Karen Bowen	karen.l.bowen@ac.com
CH 00-3-14	6/06/00	John Roberts M.S., P.E.	Engineering Plus, Inc. 818 207th Ave., NE Redmond, WA 98053
CH 00-3-15	6/06/00	Richard Rabin	Task Force on Lead Poisoning 8 Sawin St. Arlington, MA 02474
CH 00-3-16	6/06/00	Betty Bridges RN	12602 Reed Rock Rd. Amelia, VA 23002
CH 00-3-17	6/07/00	John Hausbeck M.S., R.S.	Madison Dept. of Public Health Madison, WI
CH 00-3-18	6/07/00	Barry Castleman Sc.D	2412 Pickwick Rd. Baltimore, MD 21207
CH 00-3-19	6/07/00		rkjfabf@aol.com
CH 00-3-20	6/07/00	Megan Sandel MD	91 E Concord St, 4th Fl Boston, MA 02118
CH 00-3-21	6/07/00	C. Archambault, M.D.	CONARCH@aol.com
CH 00-3-22	6/07/00	Tom Neltner	Improving Kids' Environment 5244 Carrollton Ave. Indianapolis, IN 46220

Petition HP 00-3 Requesting a Ban of Candle Wicks Containing Lead and of Candles Containing Such Wicks

CH 00-3-23	6/07/00	Jerome Paulson MD, Associate Professor of Medicine, Pediatrics and Community Health	George Washington Univ. 2150 Pennsylvania Ave, NW, Washington, DC 20037
CH 00-3-24	6/07/00	Kathy Dorn	activenow@hotmail.com
CH 00-3-25	6/08/00	Paul Lutz	PELPLA@aol.com
CH 00-3-26	6/08/00	G. Craig, P.E.	CraigG@FAC.UNC.EDC
CH 00-3-27	6/08/00	Peter Wood	Pandemonium@icon.co.za (South Africa)
CH 00-3-28	6/07/00	M. Borgialli MP.H., M.S.W. & D. Borgialli MP.H, D.O.	Michigan Department of Community Health
CH 00-3-29	6/08/00	Janine Melrose	P.O. Box 2885 La Crosse, WI 54602
CH 00-3-30	6/08/00	Robin S.	ris63@hotmail.com
CH 00-3-31	6/08/00	James Diamond M.D., Fellow, American Academy Of Pediatrics	JMDia@aol.com Berkeley, CA 94703
CH 00-3-32	6/08/00	Charles Miller Ph.D, Associate Professor of Environmental Health Sciences	Tulane Univ. School of Public Health and Tropical Medicine 1430 Tulane Ave. New Orleans, LA 70112
CH 00-3-33	6/08/00	Nancy Harrison	jnharr@gte.net
CH 00-3-34	6/08/00	Kip Flanders	kflanders@ntscdallas.com
CH 00-3-35	6/08/00	Loring Pitts	loringp@sprintmail.com
CH 00-3-36	6/09/00	Pam Smith	psmith@ntscdallas.com
CH 00-3-37	6/09/00	Tom McGrath	Tom.McGrath@ps.net
CH 00-3-38	6/10/00	Linda J. McElver	1930 Castillo Ct. San Luis Obispo, CA

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CH 00-3-39	6/09/00	Jena Roberson	jenaroberson@hotmail.com
CH 00-3-40	6/09/00	S. Weaver	Susan.Weaver@mail.state.ky.us (Kentucky Division for Air Quality)
CH 00-3-41	6/10/00	Mary Pjerrou President	Redwood Coast Watersheds Alliance P.O. Box 90 Elk, CA 95432
CH-00-3-42	6/10/00	Julia Carson Member of Congress, CD 10 Indiana	300 East Fall Creek Parkway, N. Drive Indianapolis, IN 46205
CH-00-3-43	6/10/00	Tom Johnson	tsjohnson@celanese.com
CH-00-3-44	6/11/00	Debra Goodin-Wellever	drh1998@earthlink.net
CH-00-3-45	6/11/00	Kent Roecker	jroeker@airmail.net
CH-00-3-46	6/11/00	Connie Ho	47 Maple Hill Dr. Chagrin Falls,OH 44022
CH-00-3-47	6/11/00	Tim Wallace R.S.	2055 Thomasville Rd, #A202 Tallahassee, FL 32312
CH-00-3-48	6/11/00	Steven Roth, M.D.	2 Barlett Rd Stratham, NH
CH-00-3-49	6/11/00	Hollie Hoffman	340 Sunset Dr, #607 Fort Lauderdale, FL
CH-00-3-50	6/11/00	Phil Goodrum Ph.D	Environmental Science Center Syracuse Research Corp 6225 Running Ridge Rd. N. Syracuse, NY 13212
CH-00-3-51	6/11/00	Kathy Van Dame	Wasatch Clean Air Coalition 1148 East 6600 South #7 Salt Lake City, UT 84121
CH-00-3-52	6/12/00	Sarah Johnston	661 Lansing Rd. Fultonville, NY 12072

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CH-00-3-53	6/12/00	Kim Harvey	kh8326@txmail.sbc.com
CH-00-3-54	6/12/00	K. CannCasciato	P.O. Box 244 Ellensburg, WA 98926
CH-00-3-55	6/12/00	M. Prebilic	verbmagic@earthlink.net
CH-00-3-56	6/12/00	Christina Phillips	Christina.Phillips@MW.Boeing.com
CH-00-3-57	6/12/00	Dr. L. Foster	drfoster@attcanada.ca
CH-00-3-58	6/12/00	M. Lowdermilk	901 Evernia St., West Palm Beach, FL 33401
CH-00-3-59	6/12/00	D. Wilson	1221 Berkely St. Durham, NC 27705
CH-00-3-60	6/12/00	Annie Brock	bkfamacad@surf1.de (Stuttgart, Germany)
CH-00-3-61	6/12/00	Amy Blodgett	blamy10@novagate.net (Springlake, MI)
CH-00-3-62	6/12/00	Edward Baietto	EBAIETTOMD@aol.com
CH-00-3-63	6/12/00	Lisa Zerby	lisaz@tbi.com
CH-00-3-64	6/12/00	Cherie Rivers	crivers@mos.org
CH-00-3-65	6/12/00	D. Rutherford	4053 Bayberry Dr. Chino Hills, CA 91709
CH-00-3-66	6/12/00	Deborah Corino	corino4@southwind.net
CH-00-3-67	6/12/00	Outi Salminen	oms1@cornell.edu (Ithaca, NY)
CH-00-3-68	6/12/00	Nathan Dalleska	2024 Ridgeview Ave Los Angeles, CA 90041
CH-00-3-69	6/12/00	Eric Banford	efb13@cornell.edu (Ithaca, NY)
CH-00-3-70	6/12/00	Chetana Acharya	American Lung Assn. Of Washington 2625 3rd Ave Seattle, WA 98121

Petition HP 00-3 Requesting a Ban of Candle Wicks Containing Lead and of Candles Containing Such Wicks

CH-00-3-71	5/21/00	Linda lancz	LindaLancz@aol.com
CH-00-3-72	6/12/00	Cybal Hall	cyhall@cfi-hollywood.com
CH-00-3-73	6/12/00	Sheen Perkins	2100 King Edward Dr. Reno, NV 89503
CH-00-3-74	6/12/00	Shula Edelkind	P.O. Box 95265 Atlanta, GA 30347
CH-00-3-75	6/12/00	Linda Martin	Akchum@aol.com
CH-00-3-76	6/12/00	MEC	webdesign@growminds.com
CH-00-3-77	6/12/00	Linda Wood	Lindenwood@aol.com (Omaha, NE)
CH-00-3-78	6/12/00	Marysue Griffin	14119 Ramsey Court Chester, VA 23831
CH-00-3-79	6/12/00	Gail Brewster	P.O. Box 784 Bangor, ME 04402
CH-00-3-80	6/12/00	Susan Attas	1401 Carrington Lane Vienna, VA 22182
CH-00-3-81	6/12/00	Connie Pitts	2470 S. Ouray Way Aurora, CO 80013
CH-00-3-82	6/12/00	Stacy Dallas	imdallas2@earthlink.net
CH-00-3-83	6/12/00	Joanna Ammons	6544 N Sacramento Ave #2 Chicago, IL 60645
CH-00-3-84	6/12/00	Robin Moon	BIENSKI@aol.com
CH-00-3-85	6/12/00	Liliana Angel	jaz747@worldnet.att.net
CH-00-3-86	6/12/00	Laura Kane	RJLLKane@aol.com
CH-00-3-87	6/12/00	Susan Grumman	suki_g@juno.com
CH-00-3-88	6/12/00	Christine Lang	lang_christine@bah.com
CH-00-3-89	6/12/00	Shannon Loch	207 Minter St. Uvalde, TX 78801
CH-00-3-90	6/12/00		Imadjohn@aol.com

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Petition HP 00-3 Requesting a Ban of Candle Wicks Containing Lead and of Candles Containing Such Wicks

CH-00-3-91	6/12/00	V. Copper	875 Franklin Rd Marietta, Ga
CH-00-3-92	6/12/00	M. Wise-Miu	mwisemiu@mindspring.com (Alpharetta, GA)
CH-00-3-93	6/12/00	P. Tesoriero	Pstes@aol.com
CH-00-3-94	6/12/00	Margaret Michling	jpm@greatlakes.net
CH-00-3-95	6/12/00	Helen Evett	Evett5of5@aol com
CH-00-3-96	6/12/00	D. Gabry	ggabry@sprintmail com
CH-00-3-97	6/13/00	Alecia Caine	Aleciall@aol com
CH-00-3-98	6/12/00	John Sobey Sally Sobey	jsobey@ev1.net
CH-00-3-99	6/12/00	N. Gross	ngross@a-znet com
CH-00-3-100	6/12/00	M.K. Mallory	kmallory@gateway net
CH-00-3-101	6/12/00	C. Coolbaugh	danick74@juno.com
CH-00-3-102	6/12/00	Brian Pearce	bpearce@ticnet com (Texas)
CH-00-3-103	6/12/00	Angela	davisdavidd@alltel net
CH-00-3-104	6/12/00	George Bavolak	bavolakelect@earthlink net
CH-00-3-105	6/12/00	E. Strickland Pediatric Nutritionist	Adhdpuzzle@aol com
CH-00-3-106	6/12/00	Murray Calliandra	callim@pacbell net
CH-00-3-107	6/13/00	Cathy Flanders IAG Manager	Rkfabf@aol.com
CH-00-3-108	6/13/00	Michelle Ansdell	adventurecity@prodigy net
CH-00-3-109	6/13/00	Vicky Brett	vicky.brett@khi-ro.co uk
CH-00-3-110	6/13/00	K. Santangelo	santangelokristen@hotmail com
CH-00-3-111	6/13/00	Mary Vetter	P.O. Box 254 Wallingford PA 19086

Petition HP 00-3 Requesting a Ban of Candle Wicks Containing Lead and of Candles Containing Such Wicks

CH-00-3-112	6/12/00	Shari Soloman Legislative Analyst	National Multi Housing Council 1850 M St, NW Suite 540 Washington, DC 20036
CH-00-3-113	6/13/00	Tina Neece	TinaNeece@imtt.com
CH-00-3-114	6/12/00	Patricia Erickson	waterratt@pa.freei.net
CH-00-3-115	6/13/00	Linda Menkins	MENKINSL@labs.wyeth.com
CH-00-3-116	6/13/00	Rick Knelsen Grace Knelsen	grknelsen@home.com
CH-00-3-117	6/13/00	Geri Modell	gmodell@lds.com
CH-00-3-118	6/13/00		Potatal@aol.com
CH-00-3-119	6/08/00	Peter Lurie, MPH Deputy Director & Sidney Wolfe, MD Director	Public Citizen's Health Research Group 1600 20th St., NW Washington, DC 20009
CH-00-3-120	6/06/00	Alan Ducatman MD, MSc, Chair Department of Community Medicine	Robert C. Byrd Health Sciences Center of West Virginia Univ P.O. Box 9190 Morgantown, WV 26506
CH-00-3-121	6/14/00	Jeffifer Shaw	jsha@sms.k12.us
CH-00-3-122	6/14/00	Danelle Hartline	rchdrh@earthlink.net
CH-00-3-123	6/14/00	Laura Palumbo	i.palumbo@att.net
CH-00-3-124	6/14/00	Carolyn Allen	Bunglerye@aol.com
CH-00-3-125	6/14/00	Michael Elliott	Sootguy@aol.com
CH-00-3-126	6/14/00	Ana	lanet@bellsouth.net
CH-00-3-127	6/14/00	Michael Autore	BAUTORE@email.msn.com
CH-00-3-128	6/14/00	Jeanine Louttit	louttit@impop.bellatlantic.net
CH-00-3-129	6/14/00	Judith Schulz	jschulz@ozemail.com.au

Petition HP 00-3 Requesting a Ban of Candle Wicks Containing Lead and of Candles Containing Such Wicks

CH-00-3-130	6/14/00	Elle Griswold Coordinator	Citizens for Health of the Inland Empire 11231 Heathrow Dr. Riverside, CA 92503
CH-00-3-131	6/14/00	Carolyn Ross	cross002@san.rr.com
CH-00-3-132	6/7/00	Jerome Nriagu PhD, DSc, Professor and Director	The University of Michigan 109 S Observatory St Ann Arbor, MI 48108
CH-00-3-133	6/17/00	Daphne New Mike New	candlebarn@Lneti.com
CH-00-3-134	6/29/00	Kristine Westrom	kwestrom@uswest.net
CH-00-3-135	6/24/00	Donald Meserlian P.E.	264 Park Ave., N Caldwell, NJ 07006
CH-00-3-136	7/05/00	Tanya Johnson	tajohnso@hhcorp.org
CH-00-3-137	6/29/00	Elizabeth Harvey	Guelph, ON Canada
CH-00-3-138	6/20/00	Ted Schettler MD, MPH	Boston Medical Center 124 Peterborough St., #12 Boston, MA 02215
CH-00-3-139	7/05/00	Susan Helms Asso. Scientist	shelms@tellus.org
CH-00-3-140	6/24/00	Jack Leiss Ph.D.	Analytical Sciences, Inc. 2605 Meridian Parkway Durham, NC 27713
CH-00-3-141	7/07/00	Michael Green Exec. Director	Center for Environ- mental Health 528 61st St, Suite A Oakland, Ca 94609
CH-00-3-142	6/30/00	Dave Dempsey Policy Advisor	Michigan Environ mental Council 119 Pere Marquette Dr Suite 2A Lansing, MI 48912

TAB G

Billing Code 6355-01-P

CONSUMER PRODUCT SAFETY COMMISSION

Candle Wicks Containing Lead and Candles with Such Wicks; Advance Notice of Proposed Rulemaking; Request for Comments and Information

AGENCY: Consumer Product Safety Commission.

ACTION: Advance Notice of Proposed Rulemaking.

SUMMARY: In March of 2000, the Consumer Product Safety Commission (CPSC)collectively docketed under Petition No. HP 00-3 petitions submitted by several petitioners requesting that the Commission ban candle wicks containing lead and candles with such wicks. A candle wick containing lead is one with a metallic core that contains lead. Based on information in those petitions and subsequent investigations by CPSC staff, the Commission has reason to believe that certain candles with wicks containing lead may emit toxic levels of lead as a result of normal use, and thus may contribute to substantial illness.

This advance notice of proposed rulemaking (ANPR) initiates a rulemaking proceeding that could result in a rule banning certain candle wicks containing lead and candles with such wicks. This proceeding is commenced under the Federal Hazardous Substances Act.

The Commission solicits written comments concerning the risks of illness associated with burning candles with wicks containing lead, the regulatory alternatives discussed in this notice, other possible ways to address these risks, and

the economic impacts of the various regulatory alternatives. The Commission also invites interested persons to submit an existing standard, or a statement of intent to modify or develop a voluntary standard, to address the risk of illness described in this notice.

DATE: Written comments and submissions in response to this notice must be received by [insert date that is 60 days after publication].

ADDRESSES: Comments should be mailed, preferably in five copies, to the Office of the Secretary, Consumer Product Safety Commission, Washington, D.C. 20207-0001, or delivered to the Office of the Secretary, Consumer Product Safety Commission, Room 502, 4330 East-West Highway, Bethesda, Maryland 20814; telephone (301) 504-0800. Comments also may be filed by telefacsimile to (301)504-0127 or by email to cpsc-os@cpsc.gov. Comments should be captioned "ANPR for Candle Wicks Containing Lead."

FOR FURTHER INFORMATION CONTACT: Ms. Kristina Hatlelid, Ph.D., M.P.H., Directorate for Health Sciences, Consumer Product Safety Commission, Washington, D.C. 20207; telephone (301) 504-0494, ext. 1389.

SUPPLEMENTARY INFORMATION:

A. Background/Product

On March 17, 2000, the CPSC collectively docketed as a petition under the Federal Hazardous Substances Act (FHSA) petitions received from Public Citizen and jointly from the National Apartment Association and the National Multi

Housing Council, all of which requested that the Commission ban lead-containing candles and wicks sold for candle-making that contain lead (Petition No. HP 00-3). 65 FR 19742 (April 12, 2000).

A candle wick containing lead is a wick with a metallic core that contains lead. The metallic core may be primarily lead or may be primarily zinc or tin with a lesser lead content. Such metallic cores are used to provide structural rigidity to the wick to keep it straight during candle production and to provide an upright wick during burning.

Information obtained from the petitions and subsequent Commission staff investigations indicates that burning candles containing metallic-cored wicks with a lead content exceeding 0.06% by weight may result in potentially toxic levels of air emissions of lead.

B. The Risk of Illness

The scientific community recognizes a level of 10 micrograms of lead per deciliter of blood (10 µg/dL) as a threshold level of concern with respect to lead poisoning in children. The most current national survey shows that nearly 1 million children have elevated blood lead levels (greater than (10 µg/dL). This figure represents approximately 4.4% of children under 6 years of age.

The adverse health effects of lead poisoning in children are well-documented and may have long-lasting or permanent consequences. These effects include neurological damage, delayed mental and physical development, attention

and learning deficiencies, and hearing problems. Because lead accumulates in the body, even exposure to small amounts can contribute to the subsequent risk of adverse health effects.

Investigations by the CPSC laboratory staff and other laboratories indicate that lead-cored candles can emit up to 2,200 µg of lead per hour during candle burning. These investigations also indicate that the rate at which lead might be emitted from burning a particular candle cannot reliably be predicted based on the lead content of the wick in question. CPSC staff believes that, under some use conditions, these lead emissions present a risk to consumers through inhalation of airborne lead and through contact with lead deposited onto surfaces in the room.

C. Relevant Statutory Provisions

This proceeding is conducted pursuant to the Federal Hazardous Substances Act (FHSA), 15 U.S.C. §§ 1261 *et seq.* Section 2(f)(1)(A) of the FHSA defines "hazardous substance" to include any substance or mixture of substances which is toxic and may cause substantial illness as a proximate result of any customary or reasonably foreseeable handling or use. 15 U.S.C. § 1261(f)(1)(A).

Under section 2(q)(1)(B) of the FHSA, if the Commission determines that, "notwithstanding such cautionary labeling as is or may be required under this Act for that substance, the degree or nature of the hazard involved in the presence or use of such [hazardous] substance in households is such

that the objective of the protection of the public health and safety can be adequately served only by keeping such substance, when so intended or packaged, out of the channels of interstate commerce," then such substance is a "banned hazardous substance." 15 U.S.C. § 1261(q)(1)(B).

Section 3(b) of the FHSA provides authority for the Commission to establish additional labeling requirements for hazardous substances beyond those prescribed by section 2(p)(1) of the Act if necessary for protection of the public health and safety. 15 U.S.C. § 1262(b). Once such additional requirements are established by regulation, a product intended, or packaged in a form suitable, for use in the household or by children that is not so labeled is a "misbranded" hazardous substance. *Id.*

Section 3(a) of the FHSA governs a Commission proceeding to declare a substance a "hazardous substance." 15 U.S.C § 1262(a). Sections 3(f) through 3(i), 15 U.S.C. §§ 1262(f)-(i), govern a proceeding to promulgate a regulation declaring a hazardous substance to be a banned hazardous substance.

As provided in sections 3(a)(2) and 3(f), this proceeding is commenced by issuance of this ANPR. After considering any comments submitted in response to this ANPR, the Commission will decide whether to issue a proposed rule and a preliminary regulatory analysis in accordance with section 3(h) of the FHSA. If a proposed rule is issued, the Commission would then consider the comments received in

response to the proposed rule in deciding whether to issue a final rule and a final regulatory analysis. 15 U.S.C. § 1262(i).

D. Regulatory Alternatives

One or more of the following alternatives could be used to reduce the identified risks associated with candle wicks containing lead and candles with such wicks.

1. *Mandatory rule.* The Commission could issue a rule declaring certain candle wicks containing lead and candles with such wicks to be banned hazardous substances. This rule could define the banned products in terms of physical or performance characteristics, or both.

2. *Labeling rule.* The Commission could issue a special labeling rule for candle wicks containing lead and candles with such wicks requiring that they contain specified warnings and instructions.

3. *Voluntary standard.* If the industry developed, adopted, and substantially conformed to an adequate voluntary standard, the Commission could defer to the voluntary standard in lieu of issuing a mandatory rule.

E. Existing Standards

In 1974, the Candle Manufacturers Association trade group made a voluntary commitment to eliminate lead from candle wicks. However, analyses by CPSC and by Public Citizen of the lead content of recently-purchased metallic wick candles show that wicks in some candles currently on the market continue to contain substantial amounts of lead.

In September 1999 the Australian Minister for Financial Services and Regulation banned the sale of candles with lead wicks in that country. In June 2000 the New Zealand Minister of Consumer Affairs banned the importation or sale of lead wick candles in that country. According to Commission staff, neither of these bans are based on a standard for maximum allowable lead level. The Commission is not aware of any other promulgated state, voluntary, foreign, international, or other standard dealing with the described risk of illness.

F. Economic Considerations

1. *Candle sales.*

Retail sales of candles in the U.S. for 1999 are estimated to be $2.3 billion, and are expected to rise to $3.2 billion in 2001. U.S. imports of candles in 1999 amounted to about $484 million, about half from the Far East, about one third from the Americas (mostly Canada and Mexico), and less than 10 percent from Europe and Great Britain.

2. *Suppliers.*

Based on information gathered by CPSC staff, there are at least 200 and possibly over 350 commercial, institutional, and religious manufacturers of candles in the U.S. Most of these manufacturers are apparently small businesses.

There are only a few manufacturers of candle wicks in the U.S. The leading domestic firm indicates to CPSC staff

that it supplies the majority of candle wicks to the U.S. candle industry.

3. *Substitutes.*

CPSC staff believes that substitutes for lead wicks are readily available. Staff also believes that substituting non-lead materials for lead in wicks will not increase costs to candle manufacturers or consumers. Comments on both of these issues are specifically solicited.

G. Solicitation of Information and Comments

This ANPR is an initial step in a proceeding that could result in a mandatory rule for candle wicks containing lead and candles with such wicks to address the described risk of illness. All interested persons are invited to submit to the Commission their comments on any aspect of the alternatives discussed above. In particular, CPSC solicits the following additional information:

1. The types and numbers of candle wicks containing lead and candles with such wicks produced for sale in the U.S. each year from 1990 to the present;

2. The names and addresses of manufacturers and distributors of candle wicks containing lead and candles with such wicks;

3. Comparisons of the utility obtained from candle wicks containing lead and candles with such wicks versus any available substitute products;

4. An explanation of substitutes for candle wicks containing lead and candles with such wicks that could

reduce the described risk of illness;

5. Physical or performance characteristics of the wick and candle products that could or should not be used to define which products might be subject to a rule;

6. The costs to wick and candle manufacturers involved in either substituting materials for lead in metallic-cored wicks to remove the risk or removing candles with such wicks from the market;

7. The costs to wick manufacturers/importers/distributors of testing or other efforts to ensure that wicks are in compliance.

8. Other information on the potential costs and benefits of potential rules;

9. Information on any potentially significant environmental impacts of any of the regulatory alternatives identified in this ANPR, including a ban on candles and candle wicks containing more that 0.06% lead by weight;

10. Steps that have been taken by industry or others to reduce the risk of illness from the products;

11. The likelihood and nature of any significant economic impact of a rule on small entities;

12. The costs and benefits of mandating a banning, labeling, or instructions requirement.

Also, in accordance with section 3(f) of the FHSA, the Commission solicits:

1. Written comments with respect to the risk of illness identified by the Commission, the regulatory alternatives

being considered, and other possible alternatives for addressing the risk.

2. Any existing standard or portion of a standard which could be issued as a proposed regulation.

3. A statement of intention to modify or develop a voluntary standard to address the risk of illness discussed in this notice, along with a description of a plan (including a schedule) to do so.

Comments should be mailed, preferably in five copies, to the Office of the Secretary, Consumer Product Safety Commission, Washington, D.C. 20207-0001, or delivered to the Office of the Secretary, Consumer Product Safety Commission, Room 502, 4330 East-West Highway, Bethesda, Maryland 20814; telephone (301) 504-0800. Comments also may be filed by telefacsimile to (301)504-0127 or by email to cpsc-os@cpsc.gov. Comments should be captioned "ANPR for Candle Wicks Containing Lead." All comments and submissions should be received no later than [insert date that is 60 days after publication].

Dated:

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Sadye E. Dunn, Secretary
Consumer Product Safety Commission