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

This document has been electronically approved and signed.

DATE: September 27, 2017

BALLOT VOTE SHEET

TO: The Commission
Alberta E. Mills, Acting Secretary

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

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

SUBJECT: Draft Notice of Proposed Rulemaking: *Children's Products, Children's Toys, and Child Care Articles: Determinations Regarding Lead, ASTM F963 Elements, and Phthalates for Engineered Wood Products*

BALLOT VOTE DUE: Tuesday, October 3, 2017

Staff is forwarding to the Commission a memorandum recommending that the Commission issue a notice of proposed rulemaking (NPR) for determinations that certain untreated and unfinished engineered wood products (EWPs), specifically, particleboard, hardwood plywood, and medium-density fiberboard, made from virgin wood or pre-consumer waste wood, would not contain lead, the ASTM F963 elements, or specified phthalates at concentrations that exceed the required limits under the CPSC's statutes for children's products, children's toys, and child care articles. Based on the proposed determinations, the specified EWPs would not require third party testing for compliance with these requirements. The Office of the General Counsel is providing for Commission consideration the attached draft NPR for publication in the *Federal Register*.

Please indicate your vote on the following options:

I. Approve publication of the attached draft notice of proposed rulemaking in the *Federal Register*, as drafted.

_____ _____
(Signature) (Date)

II. Approve publication of the attached draft notice of proposed rulemaking in the *Federal Register,* with changes. (Please specify.)

_____

_____

_____

_____

_____ _____

(Signature) (Date)

III. Do not approve publication of the attached draft notice of proposed rulemaking in the *Federal Register*.

_____ _____

(Signature) (Date)

IV. Take other action. (Please specify.)

_____

_____

_____

_____

_____ _____

(Signature) (Date)

Attachment: Draft *Federal Register* Notice for Notice of Proposed Rulemaking: Children's Products, Children's Toys, and Child Care Articles: Determinations Regarding Lead, ASTM F963 Elements, and Phthalates for Engineered Wood Products

[Billing Code 6355-01-P]

CONSUMER PRODUCT SAFETY COMMISSION

16 CFR Part 1252

[Docket No. CPSC-]

Children's Products, Children's Toys, and Child Care Articles: Determinations Regarding Lead, ASTM F963 Elements, and Phthalates for Engineered Wood Products

AGENCY: U.S. Consumer Product Safety Commission.

ACTION: Notice of proposed rulemaking.

SUMMARY: The Consumer Product Safety Commission (Commission, or CPSC) is proposing a rule to determine that certain untreated and unfinished engineered wood products (EWPs), specifically, particleboard, hardwood plywood, and medium-density fiberboard, made from virgin wood or pre-consumer waste wood would not contain lead, the ASTM F963 elements, or specified phthalates that exceed the limits set forth under the CPSC's statutes for children's products, children's toys, and child care articles. Based on these proposed determinations, the specified EWPs would not be required to have third party testing for compliance with the requirements for lead, ASTM F963 elements, or phthalates for children's products, children's toys, and child care articles.

DATES: Submit comments by [**INSERT DATE 75 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: You may submit comments, identified by Docket No. CPSC-2017-XXXX, by any of the following methods:

Electronic Submissions: Submit electronic comments to the Federal eRulemaking Portal at: http://www.regulations.gov. Follow the instructions for submitting comments. The Commission does not accept comments submitted by electronic mail (e-mail), except through regulations.gov. The Commission encourages you to submit electronic comments by using the Federal eRulemaking Portal, as described above.

Written Submissions: Submit written comments by mail/hand delivery/courier to: Office of the Secretary, Consumer Product Safety Commission, Room 820, 4330 East West Highway, Bethesda, MD 20814; telephone (301) 504-7923.

Instructions: All submissions received must include the agency name and docket number. All comments received may be posted without change, including any personal identifiers, contact information, or other personal information provided, to: http://www.regulations.gov. Do not submit confidential business information, trade secret information, or other sensitive or protected information that you do not want to be available to the public. If furnished at all, such information should be submitted in writing by mail/hand delivery/courier.

FOR FURTHER INFORMATION CONTACT: Jacqueline Campbell, Senior Textile Technologist, Office of Hazard Identification and Reduction, U.S. Consumer Product Safety Commission, 5 Research Place, Rockville, MD 20850: telephone 301-987-2024; email: *jcampbell@cpsc.gov*.

SUPPLEMENTARY INFORMATION:

A. Background

1. Third Party Testing and Burden Reduction

Section 14(a) of the Consumer Product Safety Act, (CPSA), as amended by the Consumer Product Safety Improvement Act of 2008 (CPSIA), requires that manufacturers of products subject to a consumer product safety rule or similar rule, ban, standard, or regulation enforced by the CPSC, must certify that the product complies with all applicable CPSC-enforced requirements. 15 U.S.C. 2063(a). For children's products, children's toys, and child care articles, certification must be based on testing conducted by a CPSC-accepted third party conformity assessment body. *Id.* Public Law No. 112-28 (August 12, 2011) directed the CPSC to seek comment on "opportunities to reduce the cost of third party testing requirements consistent with assuring compliance with any applicable consumer product safety rule, ban, standard, or regulation." Public Law No. 112-28 also authorized the Commission to issue new or revised third party testing regulations if the Commission determines "that such regulations will reduce third party testing costs consistent with assuring compliance with the applicable consumer product safety rules, bans, standards, and regulations." *Id*. 2063(d)(3)(B).

To provide opportunities to reduce the cost of third party testing requirements consistent with assuring compliance with any applicable consumer product safety rule, ban, standard, or regulations, the CPSC assessed whether children's products, children's toys, and child care articles manufactured with three engineered wood products, specifically, particleboard, hardwood plywood, and medium-density fiberboard (collectively referred to as EWPs), would comply with CPSC's requirements for lead, ASTM F963 elements or phthalates. If the Commission determines that such materials will comply with CPSC's requirements with a high degree of assurance, manufacturers

do not need to have those materials tested by a third party testing laboratory to issue a Children's Product Certificate (CPC).

2. *CPSC's Lead Standard*

Section 101 of the CPSIA has two requirements associated with lead in children's products. 15 U.S.C. 1278a. First, no accessible part of a children's product may contain more than 100 parts per million (ppm) lead content. Second, paint or other surface coatings on children's products and furniture intended for consumer use may not contain lead in concentrations greater than 90 ppm. Manufacturers of children's products must certify, based on third party testing, that their products comply with all relevant children's product safety rules. Thus, products subject to the lead content or paint/surface coating limits require passing test results from a CPSC-accepted third party laboratory for the manufacturer to issue a CPC, before the products can be entered into commerce.

To alleviate some of the third testing burdens associated with lead in the accessible component parts of children's products, the Commission determined that certain materials, including gemstones, precious metals, wood, paper, CMYK process printing inks, textiles, and specified stainless steel, do not exceed the 100 ppm lead content limit under section 101 of the CPSIA. Based on this determination, such materials do not require third party testing for the lead content limits. The determinations regarding lead content for certain materials are set forth in 16 CFR 1500.91.

3. *ASTM F963 Elements*

Section 106 of the CPSIA provides that the provisions of ASTM International, *Consumer Safety Specifications for Toy Safety* (ASTM F963), shall be considered to be

consumer product safety standards issued by the Commission.[1]15 U.S.C. 2056b. The Commission has issued a rule that incorporates by reference the relevant provisions of ASTM F963. 16 CFR part 1250. Thus, children's toys subject to ASTM F963 must be tested by a CPSC-accepted third party laboratory and demonstrate compliance with all applicable CPSC requirements for the manufacturer to issue a CPC before the children's toys can be entered into commerce.

Section 4.3.5 of ASTM F963 requires that surface coating materials and accessible substrates of children's toys that can be sucked, mouthed, or ingested[2] must comply with the solubility limits of eight elements given in Table 1 of the toy standard. The materials and their solubility limits are shown in Table 1. We refer to these eight elements as "ASTM F963 elements."

Table 1: Maximum Soluble Migrated Element in ppm (mg/kg) for Surface Coatings and Substrates Included as Part of a Toy	
Elements	Solubility Limit, (ppm)[3]
Antimony (Sb)	60
Arsenic (As)	25

[1] ASTM F963 is a consumer product safety standard, except for section 4.2 and Annex 4, or any provision that restates or incorporates an existing mandatory standard or ban promulgated by the Commission or by statute.

[2] ASTM F963 contains the following note regarding the scope of the solubility requirement: NOTE 4—For the purposes of this requirement, the following criteria are considered reasonably appropriate for the classification of children's toys or parts likely to be sucked, mouthed or ingested: (1) All toy parts intended to be mouthed or contact food or drink, components of children's toys which are cosmetics, and components of writing instruments categorized as children's toys; (2) Children's toys intended for children less than 6 years of age, that is, all accessible parts and components where there is a probability that those parts and components may come into contact with the mouth.

[3] The method to assess the solubility of a listed element is detailed in section 8.3.2, *Method to Dissolve Soluble Matter for Surface Coatings*, of ASTM F963. Modeling clays included as part of a toy have different solubility limits for several of the elements.

Barium (Ba)	1000
Cadmium (Cd)	75
Chromium (Cr)	60
Lead (Pb)	90
Mercury (Hg)	60
Selenium (Se)	500

The third party testing burden could be reduced only if all elements listed in section 4.3.5 have concentrations below their solubility limits. Because third party conformity assessment bodies typically run one test for all of the ASTM F963 elements, no testing burden reduction would be achieved if any one of the elements requires testing.

To alleviate some of the third testing burdens associated with the ASTM F963 elements in the accessible component parts of children's toys, the Commission determined that certain unfinished and untreated trunk wood does not contain ASTM F963 elements that would exceed the limits specified in section 106 of the CPSIA. Based on this determination, unfinished and untreated trunk wood would not require third party testing for the ASTM F963 elements. The determinations regarding the ASTM F963 elements limits for certain materials is set forth in 16 CFR 1251.2.

4. *Phthalates*

Section 108(a) of the CPSIA permanently prohibits the manufacture for sale, offer for sale, distribution in commerce, or importation into the United States of any "children's toy or child care article" that contains concentrations of more than 0.1 percent of di(2-ethylhexyl) phthalate (DEHP), dibutyl phthalate (DBP), or butyl benzyl phthalate

(BBP). 15 U.S.C. 2057c(a). Section 108(b)(1) prohibits on an interim basis (*i.e.*, until the Commission promulgates a final rule), the manufacture for sale, offer for sale, distribution in commerce, or importation into the United States of "any children's toy that can be placed in a child's mouth" or "child care article" containing concentrations of more than 0.1 percent of diisononyl phthalate (DINP), diisodecyl phthalate (DIDP), or di-*n*-octyl phthalate (DnOP). 15 U.S.C. 2057c(b)(1). Children's toys and child care articles subject to the content limits in section 108 of the CPSIA require third party testing for compliance with the phthalate content limits before the manufacturer can issue a CPC and enter the children's toys or child care articles into commerce.

The CPSIA required the Commission to appoint a Chronic Hazard Advisory Panel (CHAP) to "study the effects on children's health of all phthalates and phthalate alternatives as used in children's toys and child care articles." 15 U.S.C. 2057c(b)(2). The CHAP issued its report in July 2014[4]. Based on the CHAP report, the Commission published a notice of proposed rulemaking (Phthalates NPR), [5] proposing to permanently prohibit children's toys and child care articles containing concentrations of more than 0.1 percent of DINP, and proposing to lift the interim statutory prohibitions with respect to DIDP and DnOP. In addition, the Phthalates NPR proposed adding four new phthalates, DIBP, DPENP, DHEXP, and DCHP, to the list of phthalates that cannot exceed 0.1 percent concentration in accessible component parts of children's toys and child care articles. The Commission has not finalized its proposal on phthalates in children's toys and child care articles.

[4] http://www.cpsc.gov/PageFiles/169902/CHAP-REPORT-With-Appendices.pdf.
[5] https://www.federalregister.gov/articles/2014/12/30/2014-29967/prohibition-of-childrens-children's toys - and-child-care-articles-containing-specified-phthalates.

Tests for phthalate concentration are among the most expensive certification tests to conduct on a product, and each accessible component part subject to section 108 of the CPSIA must be tested.[6] Third party testing burden reductions can occur only if each phthalate's concentration is below 0.1 percent (1000 ppm). Because laboratories typically run one test for all of the specified phthalates, no testing burden reduction likely is achieved if any one of the phthalates requires compliance testing.

To alleviate some of the third testing burdens associated with plastics in the accessible component parts of children's toys and child care articles, the Commission determined that products made with general purpose polystyrene (GPPS), medium-impact polystyrene (MIPS), high-impact polystyrene (HIPS), and super high-impact polystyrene (SHIPS) with specified additives do not exceed the phthalates content limits under section 108 of the CPSIA. 82 FR 41163 (August 30, 2017). Based on this determination, materials used in children's toys and child care articles that use these specified plastics and additives would not require third party testing for the phthalates content limits. The plastics determinations are set forth in the Commission's regulations at 16 CFR part 1308.

The research that provides the basis for the phthalates determination covers the six phthalates subject to the statutory prohibition and the additional phthalates that the Commission proposed to prohibit from use in children's toys and child care articles. After the Commission finalizes its phthalates rule, the Commission will revise its phthalate determination rule to reflect the phthalates restricted by the final phthalates rule.

[6] Test costs for the content of all the specified phthalates have been reported to range from $125 to $350 per component, depending upon where the tests are conducted and any discounts that might apply.

B. Contractor's Research

CPSC contracted with the Toxicology Excellence for Risk Assessment (TERA)[7] who authored literature review reports on the content issues related to certain natural materials, plastics, and EWPs. The following reports produced by TERA formed the basis for the proposed EWP determinations: Task 9, *Concentrations of Selected Elements in Unfinished Wood and Other Natural Materials*; Task 11, *Exposure Assessment: Composition, Production, and Use of Phthalates*; and Task 14, *Final Report for CPSC Task 14*, which summarized the available information on the production of the EWPs. Each report is discussed below.

1. *TERA Task 9 Report*

In the Task 9 Report, TERA conducted a literature search on whether unfinished wood and other natural materials could be determined not to contain any of the ASTM F963 elements in concentrations greater than the ASTM F963 solubility limits.[8] The materials researched included unfinished woods (ash, beech, birch, cherry, maple, oak, pine, poplar, and walnut); bamboo; beeswax; undyed and unfinished fibers and textiles (cotton, wool, linen, and silk); and uncoated or coated paper (wood or other cellulosic fiber).

To assess the presence of the ASTM F963 elements' concentrations in the materials, TERA looked at several factors. The factors reviewed included the presence and concentrations of the elements in the environmental media (*e.g.*, soil, water, air), and

[7] After conducting the contract reports for the CPSC, TERA reorganized as the Risk Science Center at the University of Cincinnati: https://med.uc.edu/eh/centers/rsc.
[8] http://www.cpsc.gov/Global/Research-and-Statistics/TechnicalReports/Toys/TERAReportASTMElements.pdf.

in the base materials for the textiles and paper; whether processing has the potential to introduce any of the ASTM F963 elements into the material under study; and the potential for contamination after production, such as through packaging. From this report, the Commission determined that untreated and unfinished woods from tree trunks do not contain any of the elements in ASTM F963 in concentrations greater than their respective solubility limits, and thus, they are not required to be third party tested to ensure compliance with the specified solubility test.[9] TERA relied on this information in TERA Task Report 14 to determine that the virgin wood material used in the manufacture of EWPs does not, and will not, contain any of the elements in ASTM F963 in concentrations greater than their respective solubility limits.

2. *TERA Task 11 Report*

In the Task 11 Report, TERA conducted a literature search on the production and use of 11 specified phthalates in consumer products.[10] The 11 phthalates researched by TERA were based on the recommendations made in the CHAP report. Table 2 lists the phthalates researched by TERA. TERA's research focused on the following factors:

- The raw materials used in the production of the specified phthalates;
- The manufacturing processes used worldwide to produce the specified phthalates;
- Estimated annual production of the specified phthalates;
- Physical properties of the specified phthalates (*e.g.*, vapor pressure, flashpoint, water solubility, temperature at which chemical breakdown occurs);

[9] 80 FR 78651 (Dec. 17, 2015).
[10] http://www.cpsc.gov//Global/Research-and-Statistics/Technical-Reports/Other%20Technical%20Reports/TERAReportPhthalates.pdf.

- Applications for phthalates use in materials and consumer and non-consumer products; and
- Other potential routes by which phthalates can be introduced into an otherwise phthalates-free material (*e.g.*, migration from packaging, recycling, reuse, product breakdown).

Table 2: Phthalates Researched in the Task 11 Report	
Phthalate	**CASRN[11]**
DEHP: di-(2-ethylhexyl) phthalate	117-81-7
DBP: dibutyl phthalate	84-74-2
BBP: benzyl butyl phthalate	85-68-7
DINP: diisononyl phthalate	28553-12-0, 68515-48-0
DIDP: diisodecyl phthalate	26761-40-0, 68515-49-1
DnOP: di-n-octyl phthalate	117-84-0
DIOP: diisooctyl phthalate	27554-26-3
DIBP: diisobutyl phthalate	84-69-5
DPENP: di-n-pentyl phthalate	131-18-0
DHEXP: di-n-hexyl phthalate	84-75-3
DCHP: dicyclohexyl phthalate	84-61-7

TERA found that phthalates are used generally as plasticizers or softeners of certain plastics, primarily polyvinyl chloride (PVC), as solvents, and as component parts of inks, paints, adhesives, and sealants.

[11] A CAS Registry Number is assigned to a substance when it enters the CAS REGISTRY database. https://www.cas.org/content/chemical-substances/faqs.

3. *TERA Task 14 Report*

In the Task 14 Report, TERA conducted a literature search on the production of three EWPs: particleboard, hardwood plywood, and medium-density fiberboard.[12] TERA first researched authoritative sources, such as reference books and textbooks, along with Internet resources, for general information about EWPs, adhesives, raw materials, manufacturing processes, and the potential use of recycled materials. TERA used this information and consulted technical experts to identify key words for searching the literature. These key words were then used to conduct primary literature searches for research studies and publications. In addition, TERA searched for Safety Data Sheets (SDS) for information on raw materials. TERA researched the possibility of the raw materials or finished products in the three EWPs to contain:

- Lead in concentrations exceeding 100 ppm;
- Any of the specified elements that are included in the safety standard for children's toys, ASTM F963, *Standard Consumer Safety Specification for Toy Safety*, in concentrations exceeding specified solubility limits; or
- Any of 10 specified phthalates in concentrations greater than 0.1 percent (1000 ppm), listed in Table 3.[13]

[12] https://www.cpsc.gov/s3fs-public/ManufacturedWoodsTERATask14Report.pdf.
[13] The TERA research providing the basis for this determination covers the six phthalates subject to the statutory prohibition, as well as the additional phthalates the Commission proposed to prohibit in children's toys and child care articles. The phthalates determination lists only the six phthalates subject to the statutory prohibition. However, when the Commission issues a final rule for the specified phthalates in children's toys and child care articles, the Commission could revise the phthalates determination, if needed.

Table 3: Phthalates Researched in the Task 14 Report[14]	
Phthalate	CASRN
DEHP: di-(2-ethylhexyl) phthalate	117-81-7
DBP: dibutyl phthalate	84-74-2
BBP: benzyl butyl phthalate	85-68-7
DINP: diisononyl phthalate	28553-12-0, 68515-48-0
DIDP: diisodecyl phthalate	26761-40-0, 68515-49-1
DnOP: di-n-octyl phthalate	117-84-0
DIBP: diisobutyl phthalate	84-69-5
DPENP: di-n-pentyl phthalate	131-18-0
DHEXP: di-n-hexyl phthalate	84-75-3
DCHP: dicyclohexyl phthalate	84-61-7

TERA found that, generally, the processes for manufacturing the three EWPs are similar; wood fibers, chips, layers, or a similar raw wood product are processed with various adhesive formulations (sometimes referred to as binders or resins) along with other additives to create uniform sheets with known characteristics and performance qualities. The main difference among the three types of EWPs relates primarily to the size and morphology (shape and surface characteristics) of the wood material used in their production.

TERA reviewed the literature to assess whether the specified EWPs might contain lead or one or more of the other elements at levels that exceed the ASTM solubility

[14] While included in the Task 11 Report, DIOP was not included in the Task 14 Report because the ban on DIOP was proposed to be removed in the Phthalates NPR.

limits, or any of the specified phthalates in concentrations greater than the specified limits. TERA reported that no studies found lead, the ASTM F963 elements, or the specified phthalates in concentrations greater than their limits in particleboard, hardwood plywood, or medium-density fiberboard, that are unfinished and untreated, and made from virgin wood or pre-consumer wood waste.

In the Task 14 Report, TERA described an unfinished EWP as one that does not have any surface treatments applied at manufacture, such as factory-applied coatings. An untreated EWP is one that does not have any additional finishes applied at manufacture such as flame retardants or rot resistant finishes. TERA described virgin wood as wood logs, fibers, chips, or layers that have not been recycled from a previous use. TERA described pre-consumer wood waste as wood materials that have been recycled from an industrial process before being made available for consumer use. Examples of this type of waste include trimmings from EWP panel manufacturing, sawdust from cutting logs, or remaining wood pieces from sawing a log into framing lumber.

The TERA report highlighted the potential for lead, the ASTM F963 elements, or the specified phthalates to be present in concentrations greater than those specified through the use of contaminated recycled material in EWPs made from recycled wood waste or EWPs that have post-manufacturing treatments or finishes. Recycled wood waste may be made from reclaimed or post-consumer wood waste. Post-consumer wood waste is described as wood waste that is comprised of materials that are recovered from their original use and subsequently used in a new product. Examples of this type of waste include recycled demolition wood, packaging materials such as pallets and crates, used wood from landscape care (*i.e.,* from urban and highway trees, hedges, and gardens),

discarded furniture, and waste wood from industrial, construction, and commercial activities.

The three types of EWPs reviewed by TERA are discussed below.

a. *Particleboard*

Particleboard is a composite of wood chips, adhesives, and other additives pressed into a board. Adhesive formulations are used to bond wood chips, which are then formed into mats that are layered to create uniform boards in a range of dimensions. Particleboard is used widely in furniture making and other interior (or nonstructural) uses. The constituent parts of particleboard reported by TERA can include (by weight):

- Wood (60-99+ percent);
- Adhesive formulation (0-17 percent, with 5-11 percent most common)
- May include phenol-formaldehyde (uncommon but potential for use), urea-formaldehyde, melamine-urea-formaldehyde, polymeric methylene-diphenyl-diisocyanate (pMDI);
- Waxes (0.3-1 percent);
- Other additives (up to 2 percent); or
- Scavengers or additional unspecified materials.

TERA researched the possibility of lead, the ASTM F963 elements, or the specified phthalates, in concentrations greater than their specified limits in particleboard. TERA identified little information on measurements of lead and the ASTM F963 elements in particleboard and no studies that measured the specified phthalates. TERA

identified two references where particleboard made from both untreated and copper chromate arsenic-(CCA) treated wood chips was tested. Arsenic and chromium were undetected in the particleboards made from virgin wood chips. However, the particleboard composed of 25 percent wood chips from reclaimed CCA-treated wood products contained 895 and 832 ppm of arsenic and chromium, respectively, without adversely affecting the mechanical performance of the board. Another study that discussed "recycled particleboard" was identified as wood waste obtained from a wood recycling plant.

Apart from the studies on particleboard made from wood waste that may contain post-consumer wood waste or post-manufacturing treatments, TERA reported that no studies found lead, the ASTM F963 elements, or the specified phthalates in concentrations greater than the specified limits in untreated and unfinished particleboard.

b. *Hardwood Plywood*

Plywood is a layered board of wood veneers where the layers have alternating, perpendicular wood grain directions. Less commonly, the board might have a core of other EWPs with wood veneers as the outer layers. Hardwood plywood, addressed in this report, is a type of plywood that is composed of angiosperms (*i.e.*, "hardwoods," such as oak or maple) and used primarily in furniture and other interior (nonstructural) uses, as well as in playground equipment, sports equipment, and musical instruments. The constituent parts of hardwood plywood reported by TERA can include (by weight):

- Wood (75-99+ percent);
- Adhesive formulation (0.02-20 percent, with 1 percent to5 percent most common)

- May include phenol-formaldehyde or phenol-resorcinol-formaldehyde (likely for use in structural plywood but potential for application to hardwood plywood), urea-formaldehyde, melamine-formaldehyde, or melamine-urea-formaldehyde, or polyvinyl acetate (PVAc); or
- Other additives (less than 2 percent).

TERA researched the possibility of lead, the ASTM F963 elements, or the specified phthalates in concentrations greater than those specified in hardwood plywood. TERA identified only one study that measured lead and the ASTM F963 elements in plywood and no studies that measured the specified phthalates. Concentrations of cadmium, chromium, and lead, were all less than the solubility limits, in "plain" plywood. In addition, because hardwood plywood is made from sheets of wood veneer, it is less likely to contain recycled wood content, unless it incorporates a core of some other EWP, such as particleboard or medium-density fiberboard.

Aside from the studies on recycled wood waste that may contain post-consumer wood waste or post-manufacturing treatments in a particleboard, medium-density fiberboard, or other EWP core, TERA reported that no studies found lead, the ASTM F963 elements, or the specified phthalates in concentrations greater than the specified limits in untreated and unfinished hardwood plywood. However, TERA identified research which indicated that polyvinyl acetate (PVAc) can be used as an adhesive system for hardwood plywood as discussed in section (d) below.

c. *Medium-Density Fiberboard*

Medium-density fiberboard (MDF) is a composite of wood fibers, an adhesive formulation, and other additives pressed into a board. MDF is a similar product to particleboard, differing mostly due to the use of fiber rather than chips. It is used primarily in furniture and other interior (nonstructural) uses. The constituent parts of MDF reported by TERA can include (by weight):

- Wood (73-99+ percent);
- Adhesive formulation (0-25 percent with most common 5-12 percent);
- May include phenol-formaldehyde (uncommon, but potentially used for moisture resistance), urea-formaldehyde (most commonly identified), methylene-diphenyl-diisocyanate (pMDI), melamine-formaldehyde, or melamine-urea-formaldehyde;
- Waxes (less than 1 percent); or
- Other additives (10-30 percent).

TERA researched the possibility of lead, the ASTM F963 elements, or the specified phthalates in concentrations greater than those specified in MDF. TERA did not identify any references that reported the presence of lead, the ASTM F963 elements, or the specified phthalates in MDF made with virgin wood.

Aside from the studies on recycled wood waste that may contain post-consumer wood waste or post-manufacturing treatments, TERA reported that no studies found lead, the ASTM F963 elements, or the specified phthalates in concentrations greater than the specified limits in untreated and unfinished MDF.

d. *TERA's Findings on EWP Constituent Parts*

Because few references were found directly addressing lead, the ASTM F963 elements, and the specified phthalates in EWPs, TERA also researched the constituent parts that could be used to manufacture EWPs, including wood and adhesives.

Wood

According to the manufacturing process information provided by TERA, virgin wood and wood residues are the main source of wood fiber used in North America to manufacture EWPs. Typically, these sources include low value logs, industrial wood residues, or scraps and trim from furniture and EWP production. For example, hardwood plywood requires the trunks of trees to obtain the thin layers of veneer used to construct a sheet. TERA relied on the Task 9 Report and Commission findings on unfinished and untreated wood (80 FR 78651 (Dec. 17, 2015)) to determine that untreated and unfinished wood from the trunks of trees do not contain lead or the ASTM F963 elements in concentrations greater than the specified solubility limits. TERA also noted that, although phthalates can be taken up by trees and plants, the concentrations are negligible and less than the specified limit (0.1 percent).

Although TERA reported that the majority of EWPs are manufactured with virgin wood or pre-consumer wood waste fiber or chips, the wood component also can originate from recycled material. For EWPs made from recycled wood waste that may contain post-consumer wood waste, the TERA report highlighted the potential for lead, the ASTM F963 elements, or the specified phthalates to be present in concentrations greater than those specified through the use of contaminated recycled material. The TERA report cited multiple examples of the use of reclaimed or post-consumer wood material used to produce EWPs, both domestically and internationally. Specifically, TERA found studies

showing that reclaimed lumber and wood waste could contain a myriad of contaminants, such as surface treatments (*e.g.*, paints, stains), metals, glues and adhesives, glass, paper, plastic, rubber and chemical treatments. Metals and organic materials may be present in paints, stains, varnishes, and polishes that are used on wood products (*e.g.*, furniture, window frames) and nails, screws, and other metal hardware might be attached to the recycled and recovered wood. These contaminants are intimately attached to the wood, and therefore, some contaminants may pass through cleaning systems, contaminating the entire recovered wood stream.

TERA also reviewed another study, based in Italy that evaluated the "recyclability" of used wood by conducting elemental analysis of wood residues from wood recycling plants using a handheld fast energy dispersive X-ray fluorescence spectroscopy (ED-XRF) device. TERA found that the study provided some indication of types and levels of contamination in various kinds of post-consumer wood waste. Elemental analysis results were compared to EU Community Ecolabel limits.[15] For all wood products tested, 16 percent exceeded one or more of the Ecolabel limits, with the highest concentrations from lead, chromium, chlorine, copper, cadmium, and mercury. No samples had levels of arsenic over the 25 ppm limit (except a CCA-treated utility pole). Barium and lead were found in 10 percent to 20 percent of the samples, chromium and cadmium in 3 percent to 4 percent, and antimony, mercury, and arsenic ranged from 0.3 percent to 1.2 percent of samples. The sources most contaminated with non-wood

[15] Ecolabel element concentrations are less than 25 mg/kg of arsenic, 25 mg/kg of mercury, 25 mg/kg of chromium, 50 mg/kg cadmium, 90 mg/kg lead, and 40 mg/kg copper (EU, 2004). Ecolabel limits are similar to ASTM solubility limits for the ASTM F963 elements.

content were from furniture and building materials, while pallets and shipping containers were least likely to be contaminated.[16]

TERA concluded that, with an increased interest and use of post-consumer recycled materials in EWP production, potential contamination by the specified elements and phthalates must be considered. To ensure that EWPs made from used wood fibers do not contain ASTM F963 elements or phthalates the exceed the specified limits, TERA indicated that the materials would need to be sorted carefully and tested to be assured that they are not contaminated.

Adhesive Formulations

Adhesive formulations hold the wood chips, layers, or fibers together to make EWP mats and sheets. Some of the formulations use a metal catalyst during the curing process. TERA identified a number of references describing the presence of the ASTM F963 elements in adhesive formulations. However, TERA found very few references that would implicate EWPs. Although the use of barium was noted in multiple references, only one study appeared to be relevant to EWPs. This study suggested that barium, when used as a catalyst in an adhesive, could result in an EWP that exceeded the ASTM solubility level for barium.[17] However, this method does not appear to be used currently

[16] Twenty-four percent of furniture and 18 percent of building materials had one or more ASTM F963 elements exceeding the limits which may be due to manufacturing processes such as painting, preservation, and overlaying, which are common with furniture and building materials. The most polluted types of wood waste were particleboard (37% exceeded Ecolabel limits), recycled particleboard (25% exceeded), and plywood (18% exceeded); while fiberboard (MDF and HDF) exceeded limits in 9 percent of samples.

[17] Wang and Zhang (2011) studied the use of calcium hydroxide, $Ba(OH)_2$, and magnesium hydroxide and their effect on cure times for phenol formaldehyde adhesive formulations, finding that the use of $Ba(OH)_2$ could be a viable means to speed up cure times. Both calcium hydroxide and $Ba(OH)_2$ had similar cure times and are about the same price in bulk. Because the compounds would be used in an adhesive system, the catalyst is not expected to be recovered and so would remain in situ once curing is complete. If the

in EWP production. TERA also noted studies that indicate the possible use of chromium as a catalyst in phenol formaldehyde resin as well as the possible use of antimony or arsenic in a drier formulation for certain polymeric coatings. However, no references included information on concentrations or appeared relevant to EWPs.

Although many different adhesive formulations may be used in hardwood plywood, TERA noted that PVAc can be used as an adhesive system for hardwood plywood. The report cited sources (The Handbook of Adhesive Technology, USDA) that mentioned the use of some of the specified phthalates in PVAc adhesive formulations.[18] TERA also identified research papers which included the use of DBP and DEHP in PVAc at concentrations greater than 0.1 percent.

C. CPSC Staff Analysis of TERA Reports

1. *EWPs Made From Virgin Wood or Pre-Consumer Wood Waste*

CPSC staff reviewed the TERA Task 9, 11 and 14 Reports. CPSC staff also examined TERA's source references to better understand the reports' findings. CPSC's review of TERA's Task 14 Report showed that there were few studies characterizing the content of EWPs, as manufactured, in relation to lead and the ASTM F963 elements, and no studies were found on the phthalates of interest. Where there were studies, staff's review of the TERA report showed there was no evidence that untreated and unfinished EWPs made from virgin wood or pre-consumer wood waste, using generally used

catalyst remained in the adhesive, it could result in concentrations of barium exceeding the ASTM solubility limits.

[18] The USDA publication Wood Handbook: Wood as an Engineering Material (2010) explains that "Plasticizers, for example dibutyl phthalate, are used to soften the brittle vinyl acetate homopolymer in poly(vinyl acetate) emulsion adhesives. This is necessary to facilitate adhesive spreading and formation of a flexible adhesive film from the emulsion at and below room temperature."

manufacturing practices and materials, had content levels greater than the specified limits.

Staff finds that, based on the TERA reports, untreated and unfinished EPWs (particleboard, hardwood plywood, and medium-density fiberboard) made from virgin wood or pre-consumer wood waste, do not contain lead, or any of the specified elements in ASTM F963 that exceed the specified limits. In addition, with the exception of hardwood plywood that contains PVAc adhesive formulations, discussed further in this section, the specified EWPs do not contain any of the specified phthalates in concentrations greater than 0.1 percent.

2. *EWPs Made From Reclaimed or Post-Consumer Wood Waste*

The TERA Task 14 Report highlighted the risk of introducing materials contaminated with lead, the ASTM F963 elements, and the specified phthalates when using reclaimed or post-consumer wood waste to manufacture EWPs. Staff is aware that there is increasing interest in using recycled materials, rather than landfilling. Environmentally oriented initiatives encourage recycled wood content, especially in the European Union (E.U.). The E.U. Waste Framework Directive requires recycling or reuse of at least 70 percent of construction and demolition waste in member states by 2020.[19]

Staff's review of TERA's reclaimed or post-consumer waste assessment in EWPs indicates that, although most manufacturing in the Americas currently does not use post-consumer wood waste as a constituent part, EWPs with post-consumer wood content are not only technologically feasible, but also are currently available. Although the majority

[19] http://ec.europa.eu/environment/waste/construction_demolition.htm.

of the post-consumer wood waste used to manufacture EWPs is "clean," consisting of wood pallets, spools, or shipping crates, reclaimed materials could be contaminated with paint, coatings, or chemical treatments. There are some standards (*e.g.*, European Panel Federation, E.U. Community Ecolabel) for EWPs with content requirements that roughly align with the ASTM F963 requirements; however, many are voluntary and have no third party testing requirements.

Staff notes that manufacturers do have an incentive to avoid contamination of EWPs because the addition of recycled materials could be detrimental to manufacturing equipment or the finished product's performance. Surface coatings, such as paint or stains, metals from nails or fasteners, adhesive formulations, such as resins or glues, and other non-wood content can potentially damage equipment, stop a production line, or adversely impact the uniformity of the product. However, staff is not aware of any current manufacturer processing protocols that would keep unwanted contaminants out of EWP manufacturing. Because of the contamination issues identified, the staff does not have a high degree of assurance that EWPs made from post-consumer wood waste are compliant with sections 101, 106, or 108 of the CPSIA at this time.

3. *EWPs With Post-Manufacturing Treatments or Finishes*

Staff's review of the Task 14 Report shows that most consumer products made from EWPs will have some additional treatments or finishes that are applied to the EWPs after their manufacture. TERA's report identified that certain surface treatments (*e.g.*, paints, stains), metals, glues and adhesives, glass, paper, plastic, rubber and chemical treatments may be added to EWPs. Metals and organic materials may be present in paints, stains, varnishes, and polishes that are used on wood products (*e.g.*, furniture,

window frames) and nails, screws, and other metal hardware might be attached to the recycled and recovered wood.

Staff's review shows that post-manufacturing treatments or finishes made be applied to EWPs manufactured from virgin or pre-consumer wood waste, as well as EWPs manufactured from post-consumer wood waste. Such treatments or finishes may include paint or similar surface coating materials, flame retardants, rot resistant finishes, wood glue, or metal fasteners. The TERA report indicated that coatings, finishes, and chemical treatments, such flame-retardant coatings or rot resistant finishes, are a potential source of phthalates or the ASTM F963 elements. Staff's review of EWPs that have post-manufacturing treatments or finishes shows that there is potential for lead, the ASTM F963 elements, or the specified phthalates to be present in concentrations greater than at the specified levels. Unless a post-manufacture treatment or finish has been determined by the CPSC to be compliant with sections 101, 106, or 108 of the CPSIA,[20] staff does not have a high degree of assurance that EWPs that have post-manufacturing treatments or finishes are compliant with sections 101, 106, or 108 of the CPSIA at this time.

4. *Adhesive Formulations in EWPs*

The Task 14 Report generally found that there was little evidence to suggest that the ASTM F963 elements are likely to be present in any of the commonly used adhesives in concentrations greater than the ASTM solubility limits. Staff notes, that although one study suggested that barium, when used as a catalyst in an adhesive, could result in an

[20] *See* 16 CFR 1500.91; 16 CFR 1250.2; 16 CFR part 1308.

EWP that exceeded the ASTM solubility level for barium, this method does not appear to be used currently in EWP production.

Staff's review of the Task 11 Report indicates that phthalates could be used in some adhesive formulations, including in PVAc adhesives, such as wood or craft glues. In addition, the Task 14 Report identified the adhesive formulations used in the manufacture of EWPs and found that one, PVAc, could contain at least one of the specified phthalates. TERA also reported that PVAc could be used in hardwood plywood manufacturing. However, TERA was unable to identify whether the specific PVAc adhesive formulations used currently in the manufacture of hardwood plywood contained any of the specified phthalates in concentrations greater than the specified limits.

CPSC staff research indicates that PVAc may be associated with the manufacture of hardwood plywood, consistent with TERA's finding. One manufacturer of EWP adhesive formulations provided information through a contact at the USDA Forest Products Laboratory. The manufacturer confirmed that, while current formulations no longer use phthalates, PVAc adhesive formulations they manufacture contained phthalates in the past. The manufacturer also stated that there is greater use of PVAc adhesive formulations in hardwood plywood than indicated in the TERA report, perhaps due to an increasing interest in lowering formaldehyde emissions from EWPs. Because of the lack of information regarding the use of PVAc adhesives containing the specified phthalates in concentrations greater than those allowed, staff does not have a high degree of assurance that EWPs that include PVAc adhesive formulations in hardwood plywood are compliant with sections 101, 106, or 108 of the CPSIA at this time.

D. Determinations for EWPs

1. Legal Requirements for a Determination

As discussed in section A.1. of the preamble, section 14(a)(2) of the CPSA requires third party testing for children's products that are subject to a children's product safety rule. 15 U.S.C. 2063(a)(2). Children's products must comply with the lead limits in section 101 of the CPSIA. 15 U.S.C. 1278a. Children's toys must comply with the solubility limits for elements under the ASTM toy standard in section 106 of the CPSIA. 15 U.S.C. 2056b. Children's toys and child care articles must comply with the phthalates prohibitions in section 108 of the CPSIA. 15 U.S.C. 2057c. In response to statutory direction, the Commission has investigated approaches that would reduce the burden of third party testing while also assuring compliance with CPSC requirements. As part of that endeavor, the Commission has considered whether certain materials used in children's products, children's toys, and child care articles would not require third party testing.

To issue a determination that an EWP does not require third party testing, the Commission must have sufficient evidence to conclude that the product consistently complies with the CPSC requirements to which the EWP is subject so that third party testing is unnecessary to provide a high degree of assurance of compliance. Under 16 CFR part 1107 section 1107.2, "a high degree of assurance" is defined as "an evidence-based demonstration of consistent performance of a product regarding compliance based on knowledge of a product and its manufacture."

For accessible component parts of children's products, children's toys, and child care articles subject to sections 101, 106, and 108 of the CPSIA, compliance to the

specified content limits is always required, irrespective of any testing exemptions. Thus, a manufacturer or importer who certifies a children's product, toy or child care article, must assure the product's compliance. The presence of lead, the ASTM F963 elements, or the specified phthalates does not have to be intended to require compliance. The presence of these chemicals, whether for any functional purpose, as a trace material, or as a contaminant, must be in concentrations less than the specified content or solubility limits for the material to be compliant. Additionally, the manufacturer or importer must have a high degree of assurance that the product has not been adulterated or contaminated to an extent that would render it noncompliant. For example, if a manufacturer or importer is relying on a determination that an EWP does not contain lead, ASTM F963 elements, or specified phthalates in concentrations greater than the specified limits in a children's product, children's toy, or child care article, the manufacturer must ensure that the EWP is one on which a determination has been made.

Furthermore, under the proposed rule, any determinations that are made on EWPs are limited to unfinished and untreated EWPs made from virgin wood or pre-consumer wood waste. Children's products, children's toys, and child care articles made from these EWPs may have other materials that are applied to or added on to the EWP after it is manufactured, such as treatments and finishes. Such component parts fall outside of the scope of the proposed determinations and would be subject to third party testing requirements, unless the component part has a separate determination which does not require third-party testing for certification purposes. Finally, even if a determination is in effect and third party testing is not required, a certifier must still issue a certificate.

The three engineered woods for which the determinations are proposed are: particleboard, hardwood plywood, and medium-density fiberboard. Based on staff's review of the TERA reports as discussed in section C. of the preamble, the Commission is proposing determinations that there is a high degree of assurance that these three EWPs in an untreated and unfinished state made from virgin or pre-consumer wood waste will not contain lead, the ASTM F963 elements, or the specified phthalates in excess of allowable levels. Specifically, the Commission is proposing determinations that would find that particleboard and MDF that is untreated and unfinished and made with virgin wood or pre-consumer wood waste, would not contain lead, the ASTM F963 elements, or the specified phthalates (DEHP, DBP, BBP, DINP, DIDP, or DnOP) in concentrations greater than their specified limits.

In addition, with the exception of hardwood plywood that contains PVAc adhesive formulations, untreated and unfinished hardwood plywood made with virgin wood or pre-consumer wood waste would be determined not to contain lead, the ASTM F963 elements, and the specified phthalates in concentrations greater than their specified limits.

These determinations would mean that, for the specified EWPs, third party testing is not required to assure compliance with sections 101, 106, and 108 of the CPSIA. The Commission proposes to make these determinations to reduce the third party testing burden on children's product certifiers while continuing to assure compliance.

2. Statutory Authority

Section 3 of the CPSIA grants the Commission general rulemaking authority to issue regulations, as necessary, to implement the CPSIA. Public Law 110-314, sec. 3,

Aug. 14, 2008. Section 14 of the CPSA, which was amended by the CPSIA, requires third party testing for children's products subject to a children's product safety rule. 15 U.S.C. 2063(a)(2). Section 14(d)(3)(B) of the CPSA, as amended by Public Law 112-28, gives the Commission the authority to "prescribe new or revised third party testing regulations if it determines that such regulations will reduce third party testing costs consistent with assuring compliance with the applicable consumer product safety rules, bans, standards, and regulations." *Id.* 2063(d)(3)(B). These statutory provisions authorize the Commission to propose a rule determining that certain EWPs would not be determined to contain lead, the ASTM F963 elements, and the specified phthalates (DEHP, DBP, BBP, DINP, DIDP, or DnOP)[21] in concentrations greater than their specified limits, and thus, are not required to be third party tested to assure compliance with sections 101, 106, and 108 of the CPSIA.

The proposed determinations would relieve the three specified EWPs from the third party testing requirement of section 14 of the CPSA for purposes of supporting the required certification. However, the proposed determinations would not be applicable to any other EWPs beyond those listed in the proposed rule. Moreover, the proposed determinations are not applicable to EWPs that are not made of virgin wood or pre-consumer wood waste, or to EWPs that have post-manufacture treatments or finishes. The proposed determinations also are not applicable to hardwood plywood that contain PVAc adhesive formulations. The proposed determinations would only relieve the manufacturers' obligation to have the specified EWPs tested by a CPSC accepted third party conformity assessment body. Children's products, children's toys, and child care

[21] *See supra* note 13.

articles must still comply with the substantive content limits in section 101, 106, and 108 of the CPSIA regardless of any relief on third party testing requirements.

3. Description of the Proposed Rule

This proposed rule would create a new Part 1252 for "Children's Products, Children's toys, and Child Care Articles: Determinations Regarding Lead, ASTM F963 Elements, and Phthalates for Engineered Wood Products." The proposed rule would determine that the specified three EWPs do not contain lead in concentrations exceeding 100 ppm, any of the ASTM F963 elements in excess of specified concentrations, and any of the statutorily prohibited phthalates (DEHP, DBP, BBP, DINP, DIDP, DnOP) in concentrations greater than 0.1 percent. As discussed in section A.4. of the preamble, the agency is currently involved in rulemaking to determine whether to continue the interim prohibitions in section 108 and whether to prohibit any other phthalates in children's toys or child care articles. TERA's examination covered all phthalates that are subject to the current permanent and interim prohibitions, as well as the additional phthalates the Commission proposed restricting in the Phthalates NPR. If the Commission issues a final rule in the phthalates rulemaking before finalizing this determinations rulemaking, the final determinations rule for EPWs would cover the same phthalates restricted by the final phthalates rule.

Section 1252.1(a) of the proposed rule explains the statutorily-created requirements that limit lead in children's products under the CPSIA and the third party testing requirements for children's products.

Section 1252.1(b) of the proposed rule explains the statutorily-created requirements for limiting the ASTM F963 elements in children's toys under the CPSIA and the third party testing requirements for children's toys.

Section 1252.1(c) of the proposed rule explains the statutorily-created requirements limiting phthalates for children's toys and child care articles under the CPSIA and the third party testing requirements for children's toys and child care articles.

Section 1252.2 of the proposed rule would provide definitions that apply to part 1252.

Section 1252.3(a) of the proposed rule would establish the Commission's determinations that specified EWPs do not exceed the lead content limits with a high degree of assurance as that term is defined in 16 CFR part 1107.

Section 1252.3(b) of the proposed rule would establish the Commission's determinations that specified EWPs do not exceed the solubility limits for ASTM F963 elements with a high degree of assurance as that term is defined in 16 CFR part 1107.

Section 1252.3(c) of the proposed rule would establish the Commission's determinations that specified EWPs do not exceed the phthalates content limits, with the exception of hardwood plywood containing PVAc, with a high degree of assurance as that term is defined in 16 CFR part 1107.

Section 1252.3(d) of the proposed rule states that accessible component parts of children's products, children's toys, and child care articles made with the specified EWPs, are not required to be third party tested pursuant to section 14(a)(2) of the CPSA and 16 CFR part 1107.

Section 1252.3(e) of the proposed rule states that accessible component parts of children's products, children's toys , and child care articles that are not specifically listed in the determinations in proposed § 1252.3(a)-(c) are required to be third party tested pursuant to section 14(a)(2) of the CPSA and 16 CFR part 1107.

4. *Comments on the Proposed Rule*

The Commission seeks comments on all aspects of the proposed rule. In particular, comments of the following topics are welcome.

- Are there any data or examples that indicate that the EWPs identified in the proposed rule can and do contain lead, the ASTM F963 elements, or prohibited phthalates at levels that are not compliant? Please provide data supporting your assertion.
- The TERA Task 14 Report identified the use of some of the ASTM F963 elements as catalysts in adhesive formulations used to manufacture EWPs. Please provide any information that supports or refutes the claim that these elements will not be present in concentrations greater than their specified limits in EWPs.
- CPSC staff has heard from a manufacturer of PVAc adhesive formulations used in the manufacture of hardwood plywood that, although phthalates are no longer used in domestic production, they were once used. What phthalates were used in PVAc in the past? Could any of the specified phthalates be used? Why or why not? Are any of the specified phthalates used in domestic or international manufacturing of EWPs? Why or why not?

- How can one determine if a hardwood plywood sheet contains a PVAc adhesive system? How can one determine whether a PVAc adhesive system used in the manufacture of hardwood plywood contains a specified phthalate in concentrations greater than the specified limits? Can this type of information be found on labels, SDSs, company websites, or in some other way?
- Other than PVAc, are there additional adhesive formulations used in the manufacture of EWPs that could contain the specified phthalates in concentrations greater than those specified? If yes, what phthalates are used and at what concentration?
- Are there any post-consumer recycled EWPs that consistently comply with the limits for lead, ASTM F963 elements, or prohibited phthalates?
- Please describe the methods used to determine whether post-consumer recycled material is used in the manufacture of EWPs. How can this type of information be found (on labels, SDSs, company websites, or in some other way)?
- In addition to particleboard, hardwood plywood, and medium-density fiberboard, are there other EWPs widely used in children's products, children's toys, and child care articles that have not been identified in the proposed rule that do not, and will not, contain lead, the ASTM F963 elements, or prohibited phthalates in concentrations greater than the mandatory limits? Please provide supporting data.

E. Effective Date

The Administrative Procedure Act (APA) generally requires that a substantive rule must be published not less than 30 days before its effective date. 5 U.S.C. 553(d)(1).

Because the proposed rule would provide relief from existing testing requirements under the CPSIA, the Commission proposes a 30 day effective date for the final rule.

F. Regulatory Flexibility Act

1. Introduction

The Regulatory Flexibility Act (RFA) requires that agencies review a proposed rule for the rule's potential economic impact on small entities, including small businesses. Section 603 of the RFA generally requires that agencies prepare an initial regulatory flexibility analysis (IRFA) and make the analysis available to the public for comment when the agency is required to publish a notice of proposed rulemaking, unless the agency certifies that the proposed rule will not have a significant economic impact on a substantial number of small entities. The IRFA must describe the impact of the proposed rule on small entities and identify any alternatives which accomplish the statutory objectives and may reduce the significant economic impact of the proposed rule on small entities. We provide a summary of the IRFA.

2. Small Entities to Which the Proposed Rule Would Apply

The proposed rule would apply to small entities that manufacture or import children's products, children's toys, and child care articles that contain particleboard, hardwood plywood, or medium-density fiberboard. The number of domestic manufacturers classified in the North American Industrial Classification System (NAICS) categories that could manufacture children's products, children's toys, or child care articles that may contain accessible particleboard, hardwood plywood, or medium-density fiberboard component parts and would be responsible for the certification of these

products may include 7,059 firms that can be categorized as small.[22] Of these, 3,705 have fewer than 5 employees. However, it is doubtful that all of the firms in some of these categories produce children's products. Moreover, of those firms that do produce children's products, we do not know how many of the firms manufacture products with accessible particleboard, hardwood plywood, or medium-density fiberboard component parts.

The number of domestic wholesalers by NAICS code that could distribute children's products, children's toys, or child care articles that may contain accessible particleboard, hardwood plywood, or medium-density fiberboard component parts may include 26,113 firms that can be categorized as small. Of these, 15,947 have less than 5 employees. Wholesalers who obtain their products strictly from domestic manufacturers or from other wholesalers would not be impacted by the rule because the manufacturer or importer would be responsible for certifying the products. Although importers are responsible for the certification of the children's products that they import, they may rely upon third party testing performed by their foreign suppliers for purposes of certification. The number of small wholesalers that import children's products, children's toys, or child care articles as opposed to obtaining their product from domestic sources is not known. Also unknown is the number of small importers that must obtain or pay for the third party testing of their products.

[22] The numbers of small firms for each NAICS code are from the Census Bureau and generally based on the SBA criteria for small firms.

The number of domestic retailers by NAICS code that could sell children's products, children's toys, or child care articles that may contain accessible particleboard, hardwood plywood, or medium-density fiberboard component parts may include 49,358 firms that can be categorized as small. Of these, 27,506 have less than 5 employees. Although there are almost 50,000 retailers in the NAICS categories, the only retailers that would be directly impacted by the proposed rule are those that import children's products themselves. Retailers that obtain all of their products from domestic manufacturers or wholesalers will not be directly impacted by the rule because the manufacturers or wholesalers would be responsible for certifying the products.

Although comprehensive estimates of the number of children's products, children's toys, and child care articles that contain component parts made from the specified engineered woods are not available, there is evidence that these engineered woods are used in children's furniture, sporting equipment, children's toys, and some musical instruments. Based on the number of domestic toy manufacturers that are classified as small businesses by the U.S. Bureau of the Census and evidence that the specified engineered woods are used in children's products, children's toys , and child care articles, the Commission believes a substantial number of small entities would be impacted by this regulation.

3. Reporting, Recordkeeping, and Other Compliance Requirements and Impact on Small Businesses

The proposed rule would determine that there is a high degree of assurance that the certain EWPs be determined not to contain lead, the ASTM F963 elements, and the specified phthalates (DEHP, DBP, BBP, DINP, DIDP, or DnOP) in concentrations

greater than their specified limits. Under this proposed determination, manufacturers, importers, and private labelers of children's products, children's toys, and child care articles that have accessible component parts that consist of these engineered woods would not require third party testing for certification that these components comply with the lead, ASTM F963 elements, or phthalate requirements.

The proposed rule would not impose any reporting, recordkeeping, or other compliance requirements on small entities. In fact, because the proposed rule would eliminate a testing requirement, there would be a small reduction in some of the recordkeeping burden under 16 CFR parts 1107 and 1109 because manufacturers would no longer have to maintain records of third party tests for the component parts manufactured from these engineered woods for lead, the ASTM F963 elements, or the specified phthalates.

The impact of the determinations on small businesses would be to reduce the burden of third party testing for the content of lead, the ASTM F963 elements, and the specified phthalates and would be expected to be entirely beneficial. The cost of lead testing ranges from $50 to more than $100 per component through Inductively Coupled Plasma testing (ICP). If one uses X-ray fluorescence spectrometry (XRF), which is an acceptable method for certification of third-party testing for lead content, the costs can be greatly reduced to approximately $5 per component part. If a component part made with one of the specified engineered woods is painted, the component part would be exempt from the third party testing requirement, but the paint would still require lead testing.

Based on published invoices and price lists, the cost of a third party test for the ASTM F963 elements ranges from around $60 in China, up to around $190 in the United

States using ICP. This cost can be greatly reduced with the use of high definition X-ray fluorescence spectrometry (HDXRF), which is an acceptable method for certification of third-party testing for the presence of the ASTM F963 elements. The cost can be reduced to about $40 per component. It should be noted that lead is one of the ASTM F963 elements, so this testing would also cover the cost of lead testing for component parts.

The cost of phthalate testing is relatively high: between about $125 and $350 per component part, depending upon where the testing is conducted and any discounts that are applicable. Because one product might have multiple component parts that require testing, the cost of testing a single product for phthalates could exceed $1,000 in some cases. Moreover, more than one sample might have to be tested to provide a high degree of assurance of compliance with the requirements for testing. To the extent that small businesses have lower production or sales volumes than larger businesses, these determinations would be expected to have a disproportionately beneficial impact on small businesses. This beneficial impact is due to spreading the costs of the testing over fewer units; and the benefit of the Commission making the determinations would be greater on a per unit basis for small businesses. Additionally, some testing laboratories may offer their larger customers discounts that might not be available to small businesses that need fewer third party tests. Making the determinations for these engineered woods could potentially significantly benefit a substantial number of firms.

On the other hand, the benefit of making the determinations could be less than might be expected. For example, some firms might have been able to substantially reduce their third party testing costs by using component part testing as allowed under 16 CFR 1109, so the marginal benefit that might be derived from making the determinations

might be low. Also, some firms have reduced their testing costs by using XRF or HDXRF technology, which is less expensive than ICP, and would reduce the marginal benefit of these determinations. The Commission seeks public comments on the potential impact of the proposed rule on small entities. Comments are especially welcome on the following topics:

- The extent to which particleboard, hardwood plywood, and medium-density fiberboard are used in children's products, children's toys, and child care articles, especially those manufactured or imported by small firms;
- The potential reduction in third party testing costs that might be provided by the Commission making the determinations, including the extent to which component part testing is already being used and the current cost of testing components made from these engineered woods for compliance with the lead, ASTM F963 elements, and phthalate requirements;
- Any situations or conditions in the proposed rule that would make it difficult to make use of the determinations to reduce third party testing costs; and
- Although the Commission expects that the impact of the proposed rule will be entirely beneficial, any potential negative impacts of the proposed rule.

4. *Alternatives Considered to Reduce the Burden on Small Entities*

Under section 603(c) of the RFA, an initial regulatory flexibility analysis should "contain a description of any significant alternatives to the proposed rule which accomplish the stated objectives of the applicable statutes and which minimize any significant impact of the proposed rule on small entities." Because the proposed rule is intended to reduce the cost of third party testing on small businesses and will not impose

any additional burden, the Commission did not consider alternatives to the proposed rule that would reduce the burden of this rule on small businesses.

G. Environmental Considerations

The Commission's regulations provide a categorical exclusion for Commission rules from any requirement to prepare an environmental assessment or an environmental impact statement because they "have little or no potential for affecting the human environment." 16 CFR 1021.5(c)(2). This rule falls within the categorical exclusion, so no environmental assessment or environmental impact statement is required. The Commission's regulations state that safety standards for products normally have little or no potential for affecting the human environment. 16 CFR 1021.5(c)(1). Nothing in this rule alters that expectation.

List of Subjects in 16 CFR Part 1252

Business and industry, Consumer protection, Imports, Infants and children, Product testing and certification, Toys.

For the reasons stated in the preamble, the Commission proposes to amend title 16 of the CFR to add part 1252 to read as follows:

PART 1252— Children's Products, Children's toys, and Child Care Articles: Determinations Regarding Lead, ASTM F963 elements, and Phthalates for Engineered Wood Products.

Sec.

1252.1 Children's products, children's toys, and child care articles containing lead, ASTM F963 elements, and phthalates in engineered wood products and testing requirements.

1252.2 Determinations for engineered wood products.

Authority: Sec. 3, Pub. L. 110-314, 122 Stat. 3016; 15 U.S.C. 2063(d)(3)(B).

§ 1252.1 Children's products, children's toys, and child care articles containing lead, ASTM F963 elements, and phthalates in engineered wood products and testing requirements.

(a) Section 101(a) of the Consumer Product Safety Improvement Act of 2008 (CPSIA) provides that any children's product, material, or component part or a children's product must comply with a lead content limit that does not exceed 100 parts per million. Materials used in children's products subject to section 101 of the CPSIA must comply with the third party testing requirements of section 14(a)(2) of the Consumer Product Safety Act (CPSA), unless listed in 16 CFR 1500.91.

(b) Section 106 of the CPSIA made provisions of ASTM F963, Consumer Product Safety Specifications for Toy Safety, a mandatory consumer product safety standard. Among the mandated provisions is section 4.3.5 of ASTM F963 which requires that surface coating materials and accessible substrates of children's toys that can be sucked, mouthed, or ingested, must comply with solubility limits that the toy standard establishes for eight elements. Materials used in children's toys subject to section 4.3.5 of the toy standard must comply with the third party testing requirements of section 14(a)(2)

of the CPSA, unless listed in 16 CFR 1251.2.

(c) Section 108(a) of the CPSIA permanently prohibits any children's toy or child care article that contains concentrations of more than 0.1 percent of di-(2-ethylhexl) phthalate (DEHP), dibutyl phthalate (DBP), or benzyl butyl phthalate (BBP). Section 108(b)(1) of the CPSIA prohibits on an interim basis any children's toy that can be placed in a child's mouth or child care article that contains concentrations of more than 0.1 percent of diisononyl phthalate (DINP), diisodecyl phthalate (DIDP), or di-n-octyl phthalate (DnOP). Materials used in children's toys and child care articles subject to section 108(a) and (b)(1) of the CPSIA must comply with the third party testing requirements of section 14(a)(2) of the CPSA, unless listed in 16 CFR part 1308.

§ 1252.2 Definitions.

In addition to the definitions given in sections 101, 106, and 108 of the CPSIA, the following definitions apply for this part 1252.

(a) *Post-consumer wood waste* describes wood waste that is comprised of materials that are recovered from their original use and subsequently used in a new product. Examples of this type of waste include recycled demolition wood, packaging materials such as pallets and crates, used wood from landscape care (*i.e.,* from urban and highway trees, hedges, and gardens), discarded furniture, and waste wood from industrial, construction, and commercial activities.

(b) *Pre-consumer wood waste* describes wood materials that have been recycled from an industrial process before being made available for consumer use. Examples of this type of waste include trimmings from engineered wood product (EWP) panel

manufacturing, sawdust from cutting logs, or remaining wood pieces from sawing a log into framing lumber.

(c) *Unfinished* means an EWP that does not have any surface treatments applied at manufacture, such as factory-applied coatings. Examples of such treatments may include paint or similar surface coating materials, wood glue, or metal fasteners, such as nails or screws.

(d) *Untreated* means an EWP that does not have any additional finishes applied at manufacture. Examples of such finishes may include flame retardants or rot resistant finishes.

(e) *Virgin wood* describes wood logs, fibers, chips, or layers that have not been recycled from a previous use.

§ 1252.3 Determinations for engineered wood products.

(a) The following engineered wood products do not exceed the lead content limits with a high degree of assurance as that term is defined in 16 CFR part 1107:

(i) Particleboard that is untreated and unfinished made from virgin wood or pre-consumer wood waste;

(ii) Hardwood plywood that is untreated and unfinished made from virgin wood or pre-consumer wood waste; and

(iii) Medium-density fiberboard that is untreated and unfinished made from virgin wood or pre-consumer wood waste.

(b) The following engineered wood products do not exceed the ASTM F963 elements solubility limits set forth in 16 CFR part 1250 with a high degree of assurance as that term is defined in 16 CFR part 1107:

(i) Particleboard that is untreated and unfinished made from virgin wood or pre-consumer wood waste;

(ii) Hardwood plywood that is untreated and unfinished made from virgin wood or pre-consumer wood waste; and

(iii) Medium-density fiberboard that is untreated and unfinished made from virgin wood or pre-consumer wood waste.

(c) The following engineered wood products do not exceed the phthalates content limits with a high degree of assurance as that term is defined in 16 CFR part 1107:

(i) Particleboard that is untreated and unfinished made from virgin wood or pre-consumer wood waste;

(ii) Hardwood plywood that is untreated and unfinished made from virgin wood or pre-consumer wood waste and does not contain PVAc adhesive formulations; and

(iii) Medium-density fiberboard that is untreated and unfinished made from virgin wood or pre-consumer wood waste.

(d) Accessible component parts of children's products, children's toys, and child care articles made with EWPs, listed in paragraphs (a)-(c) of this section are not required to be third party tested pursuant to section 14(a)(2) of the CPSA and 16 CFR part 1107.

(e) Accessible component parts of children's products, children's toys , and child care articles made with engineered wood products not listed in paragraphs (a)-(c) of this

section are required to be third party tested pursuant to section 14(a)(2) of the CPSA and 16 CFR part 1107.

Dated: _____

_____

Alberta E. Mills, Acting Secretary
Consumer Product Safety Commission

Briefing Package

Recommendation for Determinations Regarding Third Party Testing of Engineered Wood Products for Lead, the ASTM F963 Elements, and Phthalates

September 27, 2017

The views expressed in this report are those of the CPSC staff, and they have not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.

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UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
BETHESDA, MD 20814

This document has been electronically approved and signed.

Memorandum

Date: September 27, 2017

TO: The Commission
Alberta E. Mills, Acting Secretary

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

FROM: George A. Borlase, Ph.D., P.E., Assistant Executive Director, Office of Hazard Identification and Reduction
Jacqueline Campbell, Project Manager, Directorate for Engineering Sciences, Office of Hazard Identification and Reduction

SUBJECT : **Recommendation for Determinations Regarding Third Party Testing of Engineered Wood Products for Lead, ASTM F963 Elements, and Phthalates**

Executive Summary

In support of efforts to eliminate unnecessary third party testing burdens while assuring compliance, CPSC contracted with Toxicology Excellence for Risk Assessment (TERA) to conduct literature reviews on the production of three types of engineered wood products (EWPs), particleboard, hardwood plywood, and medium-density fiberboard, and evaluate whether they potentially contain (1) lead in concentrations exceeding 100 parts-per-million (ppm), (2) any of the specified elements that are included in the safety standard for toys, ASTM F963, *Standard Consumer Safety Specification for Toy Safety*, in concentrations exceeding specified limits, or (3) any of 10 specified phthalates in concentrations greater than 0.1 percent (1000 ppm). TERA identified thousands of references for screening by their search method, which TERA believes is representative of the relevant references available. CPSC staff recommends that the Commission determine that certain untreated and unfinished[1] EWPs made from virgin[2] or pre-consumer[3]

[1] The TERA Task 14 report explains that an unfinished EWP does not have any surface treatments applied at manufacture, such as factory-applied coatings. An untreated EWP does not have any additional finishes applied at manufacture such as flame retardants or rot resistant finishes.
[2] The term *virgin wood* describes wood logs, fibers, chips, or layers that have not been recycled from a previous use.

materials do not contain lead in concentrations exceeding 100 ppm, any of the specified ASTM F963 elements in excess of specified concentrations, and any of the specified phthalates in concentrations greater than 0.1 percent (1000 ppm). If the Commission makes this determination, accessible component parts made from such engineered wood in children's products, children's toys, and child care articles subject to sections 101, 106 and 108 of the CPSIA would not require third party testing for certification purposes.

Under the proposed rule, the scope of any determinations regarding lead, the ASTM F963 elements, and the specified phthalates is limited to certain unfinished and untreated EWPs, specifically particleboard, hardwood plywood, or medium-density fiberboard, used in children's products. CPSC staff recognizes that most consumer products made from EWPs will have some additional materials that are applied, or added on, to the EWPs after the EWPs have been manufactured. These additional materials may include paint or similar surface coating materials, adhesives, such as wood glue, or metal fasteners, such as nails or screws. Unless these other components also have a determination, they would be subject to third party testing.

1 Introduction

Section 14 of the Consumer Product Safety Act (CPSA),[4] as amended by the Consumer Product Safety Improvement Act of 2008 (CPSIA),[5] requires third party testing of children's products subject to an applicable rule, ban, standard or regulation. A "children's product" is defined as a consumer product designed or intended primarily for children 12 years of age or younger.

On August 12, 2011, Public Law No. 112-28 (Pub. L. No. 112-28) was enacted. Section 2(a)(3)(B) of Pub. L. No. 112-28 states that the Commission:

> . . . may prescribe new or revised third party testing regulations if it determines that such regulations will reduce third party testing costs consistent with assuring compliance with the applicable consumer product safety rules, bans, standards, and regulations.

On November 8, 2011, the Commission issued a rule on component parts, *Conditions and Requirements for Relying on Component Part Testing or Certification, or Another Party's Finished Product Testing or Certification, to Meet Testing and Certification Requirements*, 16 C.F.R. part 1109 (the 1109 rule).[6] Under the 1109 rule, parties that test or certify consumer products pursuant to sections 14(a) and 14(i) of the CPSA may test products at the component level rather than as a finished consumer product. Accordingly, any determinations that are made

[3] The term *pre-consumer wood waste* describes wood logs, fibers, chips, or layers that have been recycled from an industrial process before being made available for consumer use. Examples of this type of waste include trimmings from EWP panel manufacturing, sawdust from cutting logs, or remaining wood pieces from sawing a log into framing lumber. The term *post-industrial wood waste* may also be used.
[4] https://www.cpsc.gov/PageFiles/105435/cpsa.pdf?epslanguage=en
[5] http://www.cpsc.gov/PageFiles/129663/cpsia.pdf.
[6] 76 FR 69546

by the Commission that certain component parts do not require third party testing may be declared on a certificate at the component level.

1.1 Lead

Section 101 of the CPSIA has two requirements associated with lead in children's products. First, no accessible part of a children's product may contain more than 100 parts per million (ppm) lead content. Second, paint or other surface coatings on children's products and some furniture[7] may not contain lead in concentrations greater than 90 ppm. Thus, products subject to the lead content or surface coating limits require passing test results from a CPSC-accepted third party laboratory for the manufacturer to issue a Children's Product Certificate (CPC), before the products can be entered into commerce.

The applicable test methods for the ban on total lead content are:

- Lead Content in Children's Metal Products, Standard Operating Procedure for Determining Total Lead (Pb) in Metal Children's Products (including Children's Metal Jewelry), Revision on November 15, 2012, Test Method CPSC-CH-E1001-08.3 (pdf).

- Lead Content in Children's Non-Metal Products, Standard Operating Procedure for Determining Total Lead (Pb) in Non-Metal Children's Products, Revision on November 15, 2012, Test Method CPSC-CH-E1002-08.3 (pdf).

- Lead Content in Paint, Standard Operating Procedure for Determining Lead (Pb) in Paint and Other Similar Surface Coatings, Revision on February 25, 2011, Test Method CPSC-CH-E1003-09.1 (pdf).

Under the proposed rule, the scope of any determinations regarding lead is limited to certain unfinished and untreated EWPs, specifically particleboard, hardwood plywood, or medium-density fiberboard, used in children's products. However, CPSC staff recognizes that most consumer products made from EWPs will have some sort of surface coating, veneer, or other surface finish in the finished product. Paint and similar surface coating materials that are applied to the EWPs after the EWP has been manufactured are still subject to third party testing. Because paint and surface coatings fall outside the scope of this proposed determination, only requirements for total lead concentrations for unfinished and untreated EWPs are used in this evaluation.

1.2 ASTM F963 Elements

Section 106 of the CPSIA states that the provisions of ASTM International (ASTM) *Standard Consumer Safety Specifications for Toy Safety* (ASTM F963, toy standard) "shall be considered to be consumer product safety standards issued by the Commission under section 9 of the CPSA (15 U.S.C. § 2058)."[8] Thus, toys[9] subject to ASTM F963[10] require passing test results

[7] Both children's and general-use, household furniture are covered under the lead requirements.
[8] ASTM F963-16 is a consumer product safety standard except for section 4.2 and Annex 4, or any provision that restates or incorporates an existing mandatory standard or ban promulgated by the Commission or by statute.

from a CPSC-accepted third party laboratory for the manufacturer to issue a CPC, before the toys can be entered into commerce.

Section 4.3.5 of ASTM F963-16 requires that surface coating materials and accessible substrates of toys that can be sucked, mouthed, or ingested,[11] must comply with the solubility limits of eight elements given in Table 1 of the toy standard. The materials and their solubility limits are shown in Table 1.

Table 1: Maximum Soluble Migrated Element in ppm (mg/kg) for Surface Coatings and Substrates Included as Part of a Toy

Elements	Solubility Limit, (ppm)[12]
Antimony (Sb)	60
Arsenic (As)	25
Barium (Ba)	1000
Cadmium (Cd)	75
Chromium (Cr)	60
Lead (Pb)	90
Mercury (Hg)	60
Selenium (Se)	500

[9] A "children's toy" is defined in section 1.3 of ASTM F963-16 as any object designed, manufactured, or marketed as a plaything for children under 14 years of age. However, the term "children's toy" is defined in section 108(e)(1)(B) of the CPSIA as a consumer product designed or intended by the manufacturer for a child 12 years of age or younger for use by the child when the child plays. Only toys intended for a child 12 years of age or younger are subject to certification requirements.

[10] While the TERA report focused on the -11 version of ASTM F963, the current version at the time, the currently accepted version is ASTM F963-16. There are no changes to the content requirements from the -11 to the -16 version, but there was a change to the testing method for the specified elements to allow High-Definition X-Ray Fluorescence Spectroscopy (HDXRF) for total element screening. See section 8.3.1.4 of ASTM F963-16.

[11] ASTM F963-16 contains the following note regarding the scope of the solubility requirement:
NOTE 4—For the purposes of this requirement, the following criteria are considered reasonably appropriate for the classification of toys or parts likely to be sucked, mouthed or ingested: *(1)* All toy parts intended to be mouthed or contact food or drink, components of toys which are cosmetics, and components of writing instruments categorized as toys; *(2)* Toys intended for children less than 6 years of age, that is, all accessible parts and components where there is a probability that those parts and components may come into contact with the mouth.

[12] The method to assess the solubility of a listed element is detailed in section 8.3.2, *Method to Dissolve Soluble Matter for Surface Coatings*, of ASTM F963-16. Modeling clays included as part of a toy have different solubility limits for several of the elements.

Third party testing burden reductions can be realized only if all eight elements in Table 1 have concentrations below their solubility limits. Because laboratories typically run one test for all of the ASTM F963 elements, it is assumed that no testing burden reduction is achieved if any one of the eight elements requires compliance testing. CPSC staff recognizes that some consumer products made from EWPs may contain some additional materials that are applied, or added on, to the EWPs after the EWPs has been manufactured, such as surface coatings, wood glue, or metal fasteners such as nails or screws. Those additional materials fall outside the scope of this proposed determination and would require third party testing for compliance with the ASTM F963 elements requirements.

1.3 Phthalates

Section 108 of the CPSIA prohibits children's toys and child care articles[13] with greater than 0.1 percent of six specified phthalates in "accessible[14] plasticized component parts and other component parts made of materials that may contain phthalates." The specified phthalates are listed in Table 2. Thus, children's toys and child care articles subject to the content limit require passing test results from a CPSC-accepted third party laboratory for the manufacturer to issue a CPC before the children's toys or child care articles can be entered into commerce.

Table 2: Specified Phthalates	
Phthalates Permanently-Prohibited in Children's Toys and Child Care Articles	**CASRN[15]**
DEHP: di-(2-ethylhexyl) phthalate	117-81-7
DBP: dibutyl phthalate	84-74-2
BBP: benzyl butyl phthalate	85-68-7
Phthalates Prohibited in Children's Toys That Can Be Placed in a Child's Mouth and in Child Care Articles	
DINP: diisononyl phthalate	28553-12-0, 68515-48-0

[13] Under section 108(e)(1)(C) of the CPSIA, the term "child care article" means a consumer product designed or intended by the manufacturer to facilitate sleep or the feeding of children age 3 and younger, or to help such children with sucking or teething.
[14] Public Law No. 112–28 amended section 108(d) of the CPSIA to provide an exclusion for certain products containing inaccessible phthalates in component parts. The Commission adopted the same guidance for inaccessible phthalates that was adopted by the Commission for inaccessible lead. See 16 C.F.R. part 1199.
[15] CASRN is an acronym for *Chemical Abstracts Service Registry Number*, and is a unique identifier for a chemical.

DIDP: diisodecyl phthalate	26761-40-0, 68515-49-1
DnOP: di-n-octyl phthalate	117-84-0

Additionally, the CPSIA directed the Commission to appoint a Chronic Hazard Advisory Panel (CHAP), to "study the effects on children's health of all phthalates and phthalate alternatives as used in children's toys and child care articles." Based on the CHAP report,[16] the Commission proposed a rule to update the list of specified phthalates under section 108 of the CPSIA.[17] The proposed rule would:

- Add four phthalates to the list of phthalates whose concentration cannot exceed 0.1 percent in children's toys and child care articles;
- Make the interim content prohibition concerning DINP permanent and expand the scope of this restriction to prohibit all children's toys (not just those that can be placed in a child's mouth) and child care articles that contain concentrations of more than 0.1 percent of DINP; and
- Remove the interim prohibitions concerning DIDP or DnOP. Table 3 lists the specified phthalates covered in the proposed rule.

[16] http://www.cpsc.gov/PageFiles/169902/CHAP-REPORT-With-Appendices.pdf.
[17] https://www.federalregister.gov/articles/2014/12/30/2014-29967/prohibition-of-childrens-toys-and-child-care-articles-containing-specified-phthalates.

Table 3: Phthalates Proposed to Be Permanently Prohibited in Children's Toys and Child Care Articles in Concentrations Greater than 0.1 Percent	
Phthalate	**CASRN**
DEHP: di-(2-ethylhexyl) phthalate	117-81-7
DBP: dibutyl phthalate	84-74-2
BBP: benzyl butyl phthalate	85-68-7
DINP: diisononyl phthalate	28553-12-0, 68515-48-0
DIBP: diisobutyl phthalate	84-69-5
DPENP: di-n-pentyl phthalate	131-18-0
DHEXP: di-n-hexyl phthalate	84-75-3
DCHP: dicyclohexyl phthalate	84-61-7

Phthalates are not naturally occurring materials, but are intentionally created and used in specific applications (*e.g*., plastics, surface coatings, solvents, inks, adhesives, and some rubberized materials). One application of phthalates in children's toys and child care articles is as a plasticizer, or softener, for glues or resins to improve their functional qualities.[18]

Tests for phthalate concentration are among the most expensive certification tests to conduct on a product, and each accessible component part subject to section 108 of the CPSIA must be tested.[19] Third party testing burden reductions can occur only if each phthalate's concentration is below 0.1 percent (1000 ppm). Because laboratories typically run one test for all of the specified phthalates, it is assumed that no testing burden reduction is achieved if any one of the phthalates requires compliance testing. CPSC staff recognizes that some consumer products made from EWPs may contain additional materials that are applied, or added on to the EWPs after the EWPs have been manufactured, such as surface coatings, wood glue, or plasticized parts. Those additional materials fall outside the scope of this proposed determination and would require third party testing for compliance with the phthalates requirements.

[18] The Merriam-Webster online dictionary defines a "plasticizer" as "a chemical added especially to rubbers and resins to impart flexibility, workability, or stretchability."

[19] Test costs for the content of all the specified phthalates have been reported to range from $125 to $350 per component, depending upon where the tests are conducted and any discounts that might apply.

2 Research Conducted

The CPSC contracted with the Toxicology Excellence for Risk Assessment (TERA, or the contractor),[20] who authored literature review reports on the content issues related to certain natural materials, plastics, and EWPs, which formed a basis for CPSC staff's recommendation to the Commission regarding determinations for EWPs. For these proposed determinations, CPSC reviewed three reports produced by TERA: Task 9, *Concentrations of Selected Elements in Unfinished Wood and Other Natural Materials*; Task 11, *Exposure Assessment: Composition, Production, and Use of Phthalates*; and Task 14, *Final Report for CPSC Task 14*. Although the Task 14 Report provides the majority of the information informing staff's recommendations in this memorandum, staff also relied, in part, on the Task 9 and 11 Reports.

2.1 Overview of TERA Research

TERA used a multipronged approach to identify sources for review from among the "universe" of available data.

For the Task 9 Report, TERA conducted a literature search for studies on the ASTM F963 elements for the identified natural materials, including unfinished and untreated wood. TERA identified and screened potentially relevant primary references for information on concentrations of chemical elements in each material. After an initial prescreen to remove duplicates, extraneous, and irrelevant studies, TERA performed a second screening to determine relevancy and likelihood for a study to contain element concentration information in the materials of interest.

For the Task 11 Report, TERA used a multitiered approach for collecting, reviewing, and compiling the information to research each of 11 specified phthalates for six factors, involving a three-tiered strategy. First (Tier 1), the "universe" of information about phthalates was pared by identifying authoritative secondary sources for the 11 specified phthalates (background search), which were searched and screened for each of the six factors for the 11 specified phthalates (Tier 2). The third tier involved gap-searching of the primary literature to identify missing information from that found using the first two tiers.

For the Task 14 Report, TERA first researched authoritative sources, such as reference books and textbooks, along with Internet resources, for general information about EWPs, adhesives, raw materials, manufacturing processes, and the potential use of recycled materials. They used this information and consulted technical experts to identify key words for searching the literature. These key words were then used to conduct primary literature searches for research studies and publications. Due to limited research on metal/elemental or phthalate contamination of EWPs, TERA cast a wide net in its literature search, screening thousands of titles and abstracts, with few relevant studies identified. Sometimes these searches identified patents, which were included to provide an indication of new technologies or materials that might suggest

[20] Staff notes that subsequent to the contract work discussed here, TERA reorganized as the Risk Science Center at the University of Cincinnati: https://med.uc.edu/eh/centers/rsc.

future technologies, but likely not current industry standards or practice. In addition, TERA searched for Safety Data Sheets (SDS) [21] for information on raw materials.

The use of this multipronged approach resulted in a comprehensive review of the available literature that represents the information available on the potential for the presence of any of the specified chemicals in the three types of EWPs.

2.2 TERA Task 9 Report

In the Task 9 Report, TERA conducted a literature search on whether unfinished wood and other natural materials could be determined not to contain any of seven specified elements in concentrations greater than the ASTM F963-11 solubility limits.[22] The materials researched were:

- Unfinished woods (ash, beech, birch, cherry, maple, oak, pine, poplar, and walnut);
- Bamboo;
- Beeswax;
- Undyed and unfinished fibers and textiles (cotton, wool, linen, and silk); and
- Uncoated or coated paper (wood or other cellulosic fiber).

TERA's research included the following factors:

- The concentrations of the seven elements in the material under study;
- The presence and concentrations of the elements in the environmental media (e.g., soil, water, air), and in the base materials for the textiles and paper;
- Whether processing has the potential to introduce any of the seven elements into the material under study; and
- The potential for contamination after production, such as through packaging.

The literature screening identified whether there is a potential for an ASTM element to be present in the natural material at levels greater than its solubility limit. From this report, CPSC staff recommended, and the Commission determined, that untreated and unfinished woods from tree trunks do not contain any of the elements in ASTM F963-11 in concentrations greater than their respective solubility limits, and thus, they are not required to be third party tested to ensure compliance with the specified solubility test.[23]

[21] SDS sheets contain information on ingredients that exceed the cut-off limits for concentrations by weight, as set by regulatory bodies (Occupational Safety and Health Administration – OSHA; Globally Harmonized System of Classification and Labelling of Chemicals – GHS). These limits are typically greater than or equal to1.0 percent for most ingredients (greater than or equal to 0.1 percent for carcinogens/mutagens) (UN, 2009). It is also worth noting that Confidential Business Information takes precedence over reporting and proprietary information is commonly omitted.

[22] The report can be found on the CPSC website at: http://www.cpsc.gov/Global/Research-and-Statistics/Technical-Reports/Toys/TERAReportASTMElements.pdf.

[23] 80 FR 78651.

TERA relied on this information to determine that the virgin wood material used in the manufacture of EWPs does not, and will not, contain any of the elements in ASTM F963-11 in concentrations greater than their respective solubility limits.

2.3 TERA Task 11 Report

In the Task 11 Report, TERA conducted a literature search on the production and use of 11 specified phthalates in consumer products.[24] TERA's research focused on the following factors:

- The raw materials used in the production of the specified phthalates;
- The manufacturing processes used worldwide to produce the specified phthalates;
- Estimated annual production of the specified phthalates;
- Physical properties of the specified phthalates (*e.g.*, vapor pressure, flashpoint, water solubility, temperature at which chemical breakdown occurs);
- Applications for phthalates use in materials and consumer and non-consumer products; and
- Other potential routes by which phthalates can be introduced into an otherwise phthalates-free material (*e.g.*, migration from packaging, recycling, reuse, product breakdown).

The 11 phthalates researched by TERA were the phthalates assessed and the recommendations made in the CHAP report. Table 4 lists the phthalates researched by TERA.

Table 4: Phthalates Researched in the Task 11 Report

Phthalate	CASRN
DEHP: di-(2-ethylhexyl) phthalate	117-81-7
DBP: dibutyl phthalate	84-74-2
BBP: benzyl butyl phthalate	85-68-7
DINP: diisononyl phthalate	28553-12-0, 68515-48-0
DIDP: diisodecyl phthalate	26761-40-0, 68515-49-1
DnOP: di-n-octyl phthalate	117-84-0
DIOP: diisooctyl phthalate	27554-26-3

[24] http://www.cpsc.gov//Global/Research-and-Statistics/Technical-Reports/Other%20Technical%20Reports/TERAReportPhthalates.pdf. The task order for this report is CPSC-D-12-0001-0011.

DIBP: diisobutyl phthalate	84-69-5
DPENP: di-n-pentyl phthalate	131-18-0
DHEXP: di-n-hexyl phthalate	84-75-3
DCHP: dicyclohexyl phthalate	84-61-7

TERA found that phthalates are used generally as plasticizers or softeners of certain plastics, primarily polyvinyl chloride (PVC), as solvents, and as component parts of inks, paints, adhesives, and sealants.

CPSC staff relied on the research conducted by TERA in the Task 11 Report to understand better the applications of phthalates in some adhesives used in the manufacture of EWPs, as discussed further below.

2.4 TERA Task 14 Report

CPSC contracted with TERA to conduct literature reviews[25] on the production of three EWPs, particleboard, hardwood plywood, and medium-density fiberboard, and the possibility of the raw materials or finished products containing:

(1) Lead in concentrations exceeding 100 ppm;
(2) Any of the specified elements that are included in the safety standard for toys, ASTM F963-11, *Standard Consumer Safety Specification for Toy Safety*, in concentrations exceeding specified solubility limits; or
(3) Any of 10 specified phthalates in concentrations greater than 0.1 percent (1000 ppm), listed in Table 5.[26]

Table 5: Phthalates Researched in the Task 14 Report[27]	
Phthalate	**CASRN**
DEHP: di-(2-ethylhexyl) phthalate	117-81-7

[25] https://www.cpsc.gov/s3fs-public/ManufacturedWoodsTERATask14Report.pdf
[26] The research providing the basis for this determination covers the six phthalates subject to the statutory prohibition, as well as the additional phthalates the Commission proposed to prohibit in children's toys and child care articles. The draft proposed rule lists only the six phthalates subject to the statutory prohibition. However, when the Commission issues a final rule for the specified phthalates in children's toys and child care articles, the Commission could revise this list, if needed, so that the final rule determination reflects the phthalates prohibitions in effect at the time of the final rule determination.
[27] While included in the Task 11 Report, DIOP was not included in the Task 14 Report because the ban on DIOP was proposed to be removed in the Phthalates NPR.

DBP: dibutyl phthalate	84-74-2
BBP: benzyl butyl phthalate	85-68-7
DINP: diisononyl phthalate	28553-12-0, 68515-48-0
DIDP: diisodecyl phthalate	26761-40-0, 68515-49-1
DnOP: di-n-octyl phthalate	117-84-0
DIBP: diisobutyl phthalate	84-69-5
DPENP: di-n-pentyl phthalate	131-18-0
DHEXP: di-n-hexyl phthalate	84-75-3
DCHP: dicyclohexyl phthalate	84-61-7

CPSC staff identified these three types of EWPs for study, based on stakeholder feedback, the likelihood of being used in products subject to children's product, children's toy, or child care article certification requirements, and available resources.

The CPSC requested that TERA investigate the topics below:

- An overview of the materials, other than natural wood or similar natural cellulosic materials (*e.g.*, adhesives, resins, and binders), and the processes used worldwide to create EWPs;
- Detailed description of the raw materials used worldwide in the production of the materials, other than natural wood or similar natural cellulosic materials, used to make EWPs (*e.g.*, adhesives, resins, and binders);
- The proportions of concentrations (or typical ranges) of the wood and non-wood components; for example, the percentage by weight of adhesives and other non-wood materials in each of the three EWP types (*i.e.*, particleboard, hardwood plywood, and medium-density fiberboard);
- Detailed description of the manufacturing processes used worldwide to create the materials (adhesives, resins, and binders) and final specified EWPs; and
- The potential use and description of any recycled materials or other additives in the production of the EWPs that could contain lead, the specified phthalates, or the specified chemical elements.

2.4.1 TERA Task 14 Report Findings

Generally, the processes for manufacturing EWPs are similar; wood fibers, chips, layers, or a similar raw wood product are processed with various adhesive formulations (sometimes referred

to as binders or resins) along with other additives to create uniform sheets with known characteristics and performance qualities. The main difference between the three types of EWPs addressed in this report relates primarily to the size and morphology (shape and surface characteristics) of the wood material used in their production. Due to these similarities, most findings apply to all of the EWPs included in the TERA report. As discussed below, there were few studies characterizing the content of EWPs as manufactured in relation to lead and the ASTM F963 elements, and no studies were found on the 10 phthalates of interest. Where there were studies, there was no evidence that untreated and unfinished EWPs made from virgin or pre-consumer wood waste had lead, the ASTM F963 elements, and the specified phthalates in concentrations above the required limits.

2.4.1.1 Particleboard

Particleboard (PB) is a composite of wood chips, adhesives, and other additives pressed into a board. Adhesive formulations are used to bond wood particles, which are then formed into mats that are layered to create uniform boards in a range of dimensions. PB is used widely in furniture making and other interior (or nonstructural) uses.

The constituent parts of PB reported by TERA can include (by weight):

- Wood (60-99+ percent);
- Adhesive formulation (0-17 percent, with 5-11 percent most common)
  May include phenol-formaldehyde (uncommon but potential for use), urea-formaldehyde, melamine-urea-formaldehyde, polymeric methylene-diphenyl-diisocyanate (pMDI);
- Waxes (0.3-1 percent);
- Other additives (up to 2 percent); or
- Scavengers or additional unspecified materials

TERA researched the possibility of lead, the ASTM F963 elements, or the specified phthalates, in concentrations greater than their specified limits through the use of recycled content or unrecovered catalysts. TERA identified little information on measurements of lead and the ASTM F963 elements in particleboard and no studies that measured the specified phthalates. In two references (Munson, 1997, and Munson and Kamdem, 1998), particleboard made from both untreated and CCA-treated wood chips was tested. Arsenic and chromium were undetected in the particleboards made from virgin wood chips. However, the particleboard composed of 25 percent wood chips from reclaimed CCA-treated wood products contained 895 and 832 ppm of arsenic and chromium, respectively, without adversely affecting the mechanical performance of the board. Fellin et al., (2014) included “recycled particleboard” in their study, but it was wood waste obtained from a wood recycling plant. Apart from the studies of particleboard made from wood waste that may have had post-manufacturing treatments, no studies found lead, the ASTM F963 elements, or the specified phthalates in concentrations above their limits in particleboard.

2.4.1.2 Hardwood Plywood

Plywood is a layered board of wood veneers where the layers have alternating, perpendicular wood grain directions. Less commonly, the board might have a core of other EWPs with wood veneers as the outer layers. Hardwood plywood, addressed in this report, is a type of plywood

that is composed of angiosperms (*i.e.*, "hardwoods," such as oak or maple) and used primarily in furniture and other interior (nonstructural) uses, as well as in playground equipment, sports equipment, and musical instruments.

The constituent parts of hardwood plywood reported by TERA can include (by weight):

- Wood (75-99+ percent);
- Adhesive formulation (0.02-20 percent, with 1 percent to5 percent most common)
  May include phenol-formaldehyde or phenol-resorcinol-formaldehyde (likely for use in structural plywood but potential for application to hardwood plywood), urea-formaldehyde, melamine-formaldehyde, or melamine-urea-formaldehyde, or polyvinyl acetate (PVAc); or
- Other additives (less than 2 percent).

TERA researched the possibility of lead, the ASTM F963 elements, or the specified phthalates in concentrations greater than those specified through the use of recycled content, PVAc adhesive formulations, or unrecovered catalysts. TERA identified only one study that measured lead and the ASTM F963 elements in plywood and no studies that measured the specified phthalates. Peltola et al., (2000) reported concentrations of cadmium, chromium, and lead, all below the solubility limits, in "plain" plywood. Because hardwood plywood is made from sheets of wood veneer, it is less likely to contain recycled wood content, unless it incorporates a core of some other EWP, such as particleboard or medium-density fiberboard. Aside from the possibility of using recycled wood waste that may have had post-manufacturing treatments in a particleboard, medium-density fiberboard, or other EWP core, no studies found lead, the ASTM F963 elements, and the specified phthalates in concentrations greater than their stated limits in hardwood plywood.

2.4.1.3 Medium-Density Fiberboard

Medium-density fiberboard (MDF) is a composite of wood fibers, an adhesive formulation, and other additives pressed into a board. MDF is a similar product to PB, differing mostly due to the use of fiber rather than chips. It is used primarily in furniture and other interior (nonstructural) uses.

The constituent parts of MDF reported by TERA can include (by weight):

- Wood (73-99+ percent);
- Adhesive formulation (0-25 percent with most common 5-12 percent)
  May include phenol-formaldehyde (uncommon, but potentially used for moisture resistance), urea-formaldehyde (most commonly identified), methylene-diphenyl-diisocyanate (pMDI), melamine-formaldehyde, or melamine-urea-formaldehyde;
- Waxes (less than 1 percent); or
- Other additives (10-30 percent).

TERA researched the possibility of lead, the ASTM F963 elements, or the specified phthalates in concentrations greater than those specified through the use of recycled content or unrecovered catalysts. TERA did not identify any references that reported the presence of lead, the ASTM F963 elements, or the specified phthalates in MDF made with virgin wood. Apart

from MDF wood waste that may have had post-manufacturing treatments, no studies found lead, the ASTM F963 elements, and the specified phthalates in concentrations above their limits in medium-density fiberboard.

2.4.1.4 TERA's Findings on EWP Constituent Parts

Because few references were found directly addressing lead, the ASTM F963 elements, and the specified phthalates in EWPs, TERA also researched the constituent parts that could be used to manufacture EWPs.

2.4.1.4.1 Wood

According to the manufacturing process information provided by TERA, virgin wood and wood residues are the main source of wood fiber used in North America to manufacture EWPs. Typically, these sources are "low value logs, industrial wood residues, or scraps and trim from furniture and EWP production." For example, hardwood plywood requires the trunks of trees to obtain the thin layers of veneer used to construct a sheet. TERA relied on the Task 9 Report and Commission findings to determine that untreated and unfinished wood from the trunks of trees does not, and will not, contain lead or the ASTM F963 elements in concentrations greater than the specified solubility limits. TERA identified only one relevant study on phthalate uptake by trees, and so reported on studies of phthalate uptake by plants, mostly vegetables and crops, as analogous to what one might expect for phthalate uptake by trees. TERA reported that while available data suggest that phthalates can be taken up by trees and plants, the concentrations are negligible and below the specified limit.

Although TERA reported that the majority of EWPs are manufactured with virgin wood or pre-consumer wood waste fiber or chips, the wood component also can originate from recycled material. According to Bosch et al., (2015), post-consumer woods are materials that are recovered from their original use and subsequently used in a new product. For EWPs made from post-consumer wood waste, the TERA report highlighted the potential for lead, the ASTM F963 elements, or the specified phthalates to be present in concentrations greater than those specified through the use of contaminated recycled material. The TERA report cited multiple examples of the use of reclaimed or post-consumer wood material used to produce EWPs, both domestically and internationally.

The TERA report found that reclaimed lumber and wood waste could contain a myriad of contaminants, such as surface treatments (*e.g.*, paints, stains), metals, glues and adhesives, glass, paper, plastic, rubber and chemical treatments (Ijeh, 2015). Metals and organics may be present in paints, stains, varnishes, and polishes that are used on wood products (*e.g.*, furniture, window frames) and nails, screws, and other metal hardware might be attached to the recycled and recovered wood (Rowell, 2011; Jeffrey, 2011; Bradley, 2014). These contaminants are intimately attached to the wood, and therefore, some contaminants may pass through cleaning systems, contaminating the entire recovered wood stream (Rowell 2011).

Fellin, et al., (2014), evaluated the "recyclability" of used wood by conducting elemental analysis of wood residues from wood recycling plants using a handheld fast energy dispersive X-ray fluorescence spectroscopy (ED-XRF) device. TERA found that the study, while primarily

based in Italy, provided some indication of types and levels of contamination in various kinds of post-consumer wood waste. Elemental analysis results were compared to EU Community Ecolabel limits.[28] For all wood products tested, 16 percent exceeded one or more of the Ecolabel limits, with the highest concentrations from lead, chromium, chlorine, copper, cadmium, and mercury. No samples had levels of arsenic over the 25 ppm limit (except a CCA-treated utility pole). Barium and lead were found in 10 percent to 20 percent of the samples, chromium and cadmium in 3 percent to 4 percent, and antimony, mercury, and arsenic ranged from 0.3 percent to 1.2 percent of samples. The authors found that the sources most contaminated with non-wood content were from furniture and building materials, while pallets and shipping containers were least likely to be contaminated. [29]

TERA concluded that with an increased interest and use of post-consumer recycled materials in EWP production, potential contamination by the specified elements and phthalates must be considered. To ensure that EWPs made from used wood fibers do not contain elements or phthalates above the limits, the materials would need to be sorted carefully and tested to be assured that they are not contaminated.

2.4.1.4.2 Adhesive Formulations

As mentioned above, adhesive formulations hold the wood chips, layers, or fibers together to make EWP mats and sheets. Some of the formulations use a metal catalyst during the curing process. TERA identified a number of references describing the presence of the ASTM F963 elements in adhesive formulations. However, very few references implicate EWPs, as discussed below.

Although the use of barium was noted in multiple references, few studies were directly relevant to EWPs. In several of these papers, barium hydroxide ($Ba(OH)_2$) was studied as an accelerant for curing, or to improve performance properties. Wang and Zhang (2011) studied the use of calcium hydroxide, $Ba(OH)_2$, and magnesium hydroxide, and their effects on cure times for phenol formaldehyde adhesive formulations. Shrivastava, et al., (2012) investigated the use of $Ba(OH)_2$ as a catalyst to increase the compressive strength, hardness, and other properties of phenolic resin beads that could be carbonized and used for high performance filtration purposes. Geng, et al., (2014) researched the addition of $Ba(OH)_2$ for improved thermal resistance and other properties in phenolic foams. Zhang, et al., (2009) conducted a study that added barium carbonate nanoparticles to phenol formaldehyde resin to improve properties such as thermal stability and glutinosity for "astronavigation" applications. Only one of these studies, Wang and Zhang (2011), appeared to have some relevance to EWPs and is discussed further in Section 3.

[28] Ecolabel element concentrations are less than 25 mg/kg of arsenic, 25 mg/kg of mercury, 25 mg/kg of chromium, 50 mg/kg cadmium, 90 mg/kg lead, and 40 mg/kg copper (EU, 2004). Ecolabel limits are similar to ASTM solubility limits for the eight elements of interest in our study.

[29] Twenty-four percent of furniture and 18 percent of building materials had one or more elements exceeding the limits. The authors of the report indicated that this may be due to manufacturing processes such as painting, preservation, and overlaying, which are common with furniture and building materials. The most polluted types of wood waste were particleboard (37% exceeded Ecolabel limits), recycled particleboard (25% exceeded), and plywood (18% exceeded); while fiberboard (MDF and HDF) exceeded limits in 9 percent of samples.

TERA noted that chromium was "historically" used as a catalyst in phenol formaldehyde resin. The article by Popov (1973) described a study on the "carbonization and graphitization of polymers" with the addition of metals to improve thermal resistance; however, no concentrations or context was given for the reference to "historical" use as a catalyst, and so the reference does not seem applicable to EWPs.

A patent by Meijer and Flapper (2013) mentions, among other metal-containing anions, the possible use of antimony or arsenic in a drier formulation for certain polymeric coatings. Wang et al., (2013) described an alternative, solvent-free method of preparing pMDI, using metal oxide catalysts, such as antimony trioxide in the formation of pMDI. Neither reference included information on concentrations. Neither reference appears to be relevant to EWPs.

Although many different adhesive formulations may be used in hardwood plywood, TERA notes that PVAc can be used as an adhesive system for hardwood plywood. The report cited sources (The Handbook of Adhesive Technology, USDA) that mentioned the use of some of the specified phthalates in PVAc adhesive formulations. The USDA publication *Wood Handbook: Wood as an Engineering Material* (2010) states:

> Plasticizers, for example dibutyl phthalate, are used to soften the brittle vinyl acetate homopolymer in poly(vinyl acetate) emulsion adhesives. This is necessary to facilitate adhesive spreading and formation of a flexible adhesive film from the emulsion at and below room temperature.

Additionally, CPSC staff has been advised that while the main domestic manufacturers of these adhesive formulations no longer use phthalates in PVAc adhesive formulations for EWPs, they were used in the past (Hunt, personal communication). TERA also identified research papers, such as those by Cameron (1987) and Feng (2002), which included the use of DBP and DEHP, respectively, in PVAc at concentrations greater than 0.1 percent. However, these papers are not highly relevant to the manufacture of EWPs because they describe exploratory research and not typical manufacturing practices. While the research papers are not relevant to EWPs, staff believes that some, although not all, PVAc adhesive formulations in hardwood plywood with concentrations above 0.1 percent (1000 ppm), may be an issue regarding the specified phthalates and are discussed further in Section 3.

3 CPSC Staff Analysis

CPSC staff reviewed the TERA Task 14 Report, with the Task 9 and 11 Reports as additional references. In many cases, CPSC staff examined the source references to fully understand the reports' findings. As discussed above, the manufacturing processes and constituent parts of EWPs are similar.

3.1 Findings in EWPs

TERA's Task 14 Report showed that there were few studies characterizing the content of EWPs as manufactured in relation to lead and the ASTM F963 elements, and no studies were found on the 10 phthalates of interest. Where there were studies, there was no evidence that untreated and unfinished EWPs made from virgin or pre-consumer wood waste had content

levels greater than the required limits. Based on the structured search method and multiple reference types used by TERA to produce the Task 9, 11, and 14 Reports, CPSC staff concludes, with a high degree of assurance, that the findings are representative of the existing universe of available scientific information on the topic.

As discussed above, the Commission previously relied on the Task 9 Report, when it determined that unfinished woods from tree trunks do not contain any of the elements in ASTM F963-11 in concentrations greater than their respective solubility limits and, thus, are not required to be third party tested to assure compliance with the specified solubility test. In addition, the Task 14 Report indicates that EWPs made from virgin or pre-consumer wood waste would not contain levels that exceed the required limits. Based on these two reports, staff believes that the Commission may propose determinations to exclude EWPs from third-party testing to assure compliance with the lead and ASTM F963 elements testing requirements. Staff notes, however, that one report, Wang and Zhang (2011), raised a question of whether the use of barium in certain adhesive formulations could exist in levels above the ASTM F963 requirement as discussed in section 3.1.2. of this memorandum. Although there was no indication that such an adhesive system is used in EWPs, staff seeks additional information on that issue.

Staff's review of TERA's findings in the Task 14 Report revealed no information on phthalates in the contents of EWPs. Staff knew from the findings in the Task 11 Report that phthalates could be used in some adhesive formulations. The Task 14 Report identified the adhesive formulations used in the manufacture of EWPs and searched references related to these search terms, noting that one, PVAc, could contain at least one of the specified phthalates. Based on the review of the adhesive formulations used in the manufacture of EWPs, the Task 14 Report was not able to identify any information indicating that particleboard and MDF contain any of the specified phthalates. However, because there is insufficient information on whether hardwood plywood containing PVAc that could contain specified phthalate concentrations above 0.1 percent (1000 ppm) are currently being manufactured, as discussed in section 3.1.2 of this memorandum, staff seeks additional information on that issue.

Based on the information provided in the TERA reports, staff recommends that the Commission propose determinations that EWPs, with certain limitations, are not required to be third party tested to ensure compliance with sections 101, 106, and 108 of the CPSIA, and any regulation promulgated by the Commission pursuant to sections 101, 106, and 108 of the CPSIA. However, for accessible component parts of children's products, children's toys, or child care articles made of EWPs on which a determination has been made, staff recommends that the Commission reiterate that no adulteration or contamination of the EWP with lead, a specified ASTM F963 element, or a specified phthalate greater than the specified limits, is allowed during the product's manufacture, transport, storage, or application into a subject product.

3.2 Recycled and Post-Consumer Wood

The TERA Task 14 Report highlighted the risk of introducing materials contaminated with lead, the ASTM F963 elements, and the specified phthalates when using post-consumer wood waste to manufacture EWPs. Due to increasing interest in post-consumer waste usage, rather than landfilling, environmentally oriented initiatives encourage recycled wood content, especially in the European Union (E.U.). The E.U. Waste Framework Directive requires

recycling or reuse of at least 70 percent of construction and demolition waste in member states by 2020.[30]

Staff's review of TERA's post-consumer waste assessment in EWPs indicates that while most manufacturing in the Americas currently does not use post-consumer wood waste as a constituent part, currently available products show that EWPs with post-consumer wood content is not only technologically feasible, but also is currently available. Although the majority of the post-consumer wood waste used to manufacture EWPs is "clean," consisting of wood pallets, spools, or shipping crates, reclaimed materials could be contaminated with paint, coatings, or some chemical treatment. There are some standards (*e.g.*, European Panel Federation, E.U. Community Ecolabel) for EWPs with content requirements that roughly align with the ASTM F963 requirements; however, many are voluntary and have no third party testing requirements. For a determination including EWPs with post-consumer recycled content to be possible, manufacturers would need to adopt processing protocols to keep unwanted contaminants out of EWP manufacturing. Staff notes that manufacturers do have an incentive to avoid contamination because it could be detrimental to manufacturing equipment or the finished product's performance. Surface coatings, such as paint or stains, metals from nails or fasteners, adhesive formulations, such as resins or glues, and other non-wood content can potentially damage equipment, stop a production line, or adversely impact the uniformity of the product (Rowell, 2011). Colak et al., (2011) studied the use of 30-year-old pine window joints recycled into particleboard and found that the properties were affected by the presence of paint in the wood feedstock, negatively for surface properties and positively for mechanical properties. Because there are no U.S. federal regulations that address lead, the ASTM F963 elements, or phthalates in EWPs (other than for specific products made from them, such as children's toys), processing, appearance, and performance issues are the only barriers to the use of post-consumer recycled content.

Because of the contamination issues identified, CPSC staff does not recommend that the Commission propose a determination for EWPs that use post-consumer wood waste, or recycled content. However, CPSC staff is interested in obtaining more information about: the manufacture of EWPs using post-consumer wood waste, including screening or other techniques to avoid contamination with lead, the ASTM F963 elements, and specified phthalates at concentrations exceeding those specified; requirements for testing; specifications for lead, the ASTM F963 elements, and the specified phthalates content; labeling or certification schemes for EWPs manufactured using post-consumer wood waste; and the current market share and future trends for use of post-consumer content in EWPs.

3.3 Adhesive formulations

The TERA report generally found that there was not much evidence to suggest that the ASTM elements are likely to be present in any of the commonly used adhesives above the ASTM solubility limits. Staff notes, however, that one study, Wang and Zhang (2011), suggested that barium, when used as a catalyst in an adhesive, could exceed the ASTM solubility level for

[30] http://ec.europa.eu/environment/waste/construction_demolition.htm

barium.[31] While this method does not appear to be used currently in EWP production, CPSC staff is interested in more information on the use of the ASTM F963 elements in adhesive formulations and whether they could be used in concentrations greater than those specified in the standard for the manufacture of EWPs.

In addition, the Task 11 Report stated that phthalates could be used in some adhesive formulations. The Task 14 Report identified the adhesive formulations used in the manufacture of EWPs and searched references related to these search terms, noting that one, PVAc, could contain at least one of the specified phthalates. Several references identified by both TERA and CPSC staff indicate that some of the specified phthalates can be used in PVAc adhesives, such as wood or craft glues. TERA also identified that PVAc could be used in hardwood plywood manufacturing. However, TERA was unable to identify whether the specific PVAc adhesive formulations used currently in the manufacture of hardwood plywood contained any of the specified phthalates. Additionally, a manufacturer of EWP adhesive formulations confirmed that, while no longer used, PVAc adhesive formulations they manufacture contained phthalates in the past (Hunt, personal communication). Other than exploratory research, CPSC staff research only found PVAc associated with the manufacture of hardwood plywood, consistent with TERA's finding. Furthermore, CPSC staff has learned that this adhesive formulation may make up a more substantial market share of the hardwood plywood adhesive formulations used than the TERA report indicates, perhaps due to an increasing interest in lowering formaldehyde emissions from EWPs (Hunt, personal communication). Accordingly, staff does not recommend, at this time, that any proposed determination include PVAc adhesive formulations that are used in hardwood plywood. However, CPSC staff is interested in more information on: the use of PVAc adhesives containing the specified phthalates in concentrations greater than those specified in the standard for the manufacture of EWPs; and, the use of labeling, SDSs, or some other indicator that PVAc might be used in an EWP.

4 Discussion

4.1 A High Degree of Assurance Is Required to Issue a CPC

A *High Degree of Assurance* is defined in 16 C.F.R. § 1107.2 as "an evidence-based demonstration of consistent performance of a product regarding compliance based on knowledge of a product and its manufacture." Section 1107.20(D) of the regulation states:

> A manufacturer cannot certify the children's product until the manufacturer establishes, with a high degree of assurance that the finished product does comply with all applicable children's product safety rules.

[31] Wang and Zhang (2011) studied the use of calcium hydroxide, $Ba(OH)_2$, and magnesium hydroxide and their effect on cure times for phenol formaldehyde adhesive formulations, finding that the use of $Ba(OH)_2$ could be a viable means to speed up cure times. Both calcium hydroxide and $Ba(OH)_2$ had similar cure times and are about the same price in bulk. Because the compounds would be used in an adhesive system, the catalyst is not expected to be recovered and so would remain in situ once curing is complete. If the catalyst remained in the adhesive, it could result in concentrations of barium above the ASTM solubility limits.

Thus, certifiers of children's products require a high degree of assurance that their product complies to the applicable children's product safety rules before they issue a Children's Product Certificate.

4.2 Required Compliance to the Lead, ASTM F963 and Phthalates Content Limits and Third Party Testing Requirements

For accessible component parts of children's products, children's toys and child care articles subject to sections 101, 106, and 108 of the CPSIA, compliance to the specified content limits is always required, irrespective of any testing exemptions. Thus, a manufacturer or importer who certifies a children's product, toy or child care article, must assure the product's compliance. The presence of lead, the ASTM F963 elements, or the specified phthalates does not have to be intended to require compliance. The presence of these chemicals, whether for any functional purpose, as a trace material, or as a contaminant, must be in concentrations less than the specified content or solubility limits for the material to be compliant. Additionally, the manufacturer or importer must have a high degree of assurance that the product has not been adulterated or contaminated to an extent that would render it noncompliant. For example, if a manufacturer or importer is relying on a determination that an EWP does not contain any specified phthalate in concentrations greater than 0.1 percent, the manufacturer must ensure that the product is one on which a determination has been made.

Furthermore, under the proposed rule, any determinations that are made on EWPs are limited to unfinished and untreated EWPs made from virgin or pre-consumer materials. Children's products made from these EWPs may have other materials that are applied to or added on to the EWP after it is manufactured, such as treatments, finishes, paint, glue, or fasteners. Such component parts fall outside of the scope of the proposed determinations and would be subject to third party testing requirements. Finally, even if a determination is in effect and third party testing is not required, a certifier must still issue a certificate.

4.3 CPSC Staff Conclusions

Considering the available evidence relating to the factors researched in the Task 9, 11, and 14 Reports, CPSC staff concludes, with a high degree of assurance, that certain EWPs do not require third party testing by a CPSC-accepted laboratory in order to issue a CPC. The Task 9 Report focused on lead and the ASTM F963 elements in wood and other natural products. The Task 11 Report focused on the production and uses of phthalates. The Task 14 Report focused on the manufacture and possibility of lead, the ASTM F963 elements, and specified phthalates in three types of EWPs.

Pub. L. No. 112-28 authorizes the Commission to issue regulations that the Commission determines "will reduce third party testing costs consistent with assuring compliance" with applicable children's product safety rules. Thus, to issue a determination, the Commission must have sufficient evidence to conclude that the material would consistently comply with the CPSC requirements so that third party testing is unnecessary to provide a high degree of assurance of compliance. Staff concludes that the Task 9, 11 and 14 Reports provide a basis for the Commission to determine that certain EWPs made from virgin or pre-consumer materials that

are unfinished and untreated do not require third party testing by a CPSC-accepted laboratory in order for a certifier to issue a CPC.

5 Recommendations

CPSC staff recommends, with some exceptions (listed below), that the Commission propose determinations that the following three EWPs be determined not to contain lead, the ASTM F963 elements, and the specified phthalates (DEHP, DBP, BBP, DINP, DIDP, or DnOP)[32] in concentrations greater than their specified limits, and thus, are not required to be third party tested to assure compliance with sections 101, 106, and 108 of the CPSIA, and any regulation promulgated by the Commission pursuant to sections 101, 106, and 108 of the CPSIA.

For accessible component parts of children's products, children's toys, or child care articles made of EWPs on which a determination has been made, no adulteration or contamination of the EWP with lead, a specified ASTM F963 element, or a specified phthalate greater than the specified limits is allowed during the product's manufacture, transport, storage, or application into a subject product.

5.1 Particleboard

CPSC staff recommends that the Commission propose a determination that untreated and unfinished particleboard made from virgin wood or pre-consumer wood waste be determined not to contain any of the following:

- Lead in concentrations greater than 100 ppm;
- Any of the ASTM F963 elements in concentrations greater than their specified solubility limits; or
- Any of the 10 phthalates researched in the Task 14 Report in concentrations greater than 0.1 percent.

5.2 Hardwood Plywood

CPSC staff recommends that the Commission propose a determination that untreated and unfinished hardwood plywood made from virgin wood or pre-consumer wood waste be determined not to contain any of the following:

- Lead in concentrations greater than 100 ppm; or

[32] The agency is currently involved in rulemaking regarding the list of phthalates subject to regulation in children's toys and child care articles in section 108 of the CPSIA (the Phthalates Rule). The research providing the basis for this determination covers the six phthalates subject to the statutory prohibition, as well as the additional phthalates the Commission proposed to prohibit in children's toys and child care articles. The draft proposed rule lists only the six phthalates subject to the statutory prohibition. However, when the Commission issues a final rule for the specified phthalates in children's toys and child care articles, the Commission could revise this list, if needed, so that the final rule determination reflects the phthalates prohibitions in effect at the time of the final rule determination.

- Any of the ASTM F963 elements in concentrations greater than their specified solubility limits.

Additionally, CPSC staff recommends that the Commission propose a determination that untreated and unfinished hardwood plywood made from virgin wood or pre-consumer wood waste, and not using polyvinyl acetate as an adhesive system, be determined not to contain the following:

- Any of the 10 phthalates researched in concentrations greater than 0.1 percent.

5.3 Medium-Density Fiberboard

CPSC staff recommends that the Commission propose a determination that untreated and unfinished medium-density fiberboard made from virgin wood or pre-consumer wood waste be determined not to contain any of the following:

- Lead in concentrations greater than 100 ppm;
- Any of the ASTM F963 elements in concentrations greater than their specified solubility limits; or
- Any of the 10 phthalates researched in concentrations greater than 0.1 percent.

5.4 Recommended Effective Date

Because the proposed determinations for the three engineered wood products would reduce the testing burden on certifiers of children's products, children's toys and child care articles, staff recommends that the Commission propose an effective date 30 days from the final rule's publication in the *Federal Register*.

6 Impact on Manufacturers and Importers of Children's Products, Children's Toys, and Childcare Articles

As detailed in Tab A, the draft proposed rule would reduce the burden of third party testing on manufacturers and importers of children's products, children's toys, and child care articles by eliminating the requirement for third party testing to certify that, accessible component parts made of certain particleboard, hardwood plywood, or medium-density fiberboard do not contain lead in concentrations exceeding 100 ppm, any of the specified ASTM F963 elements in excess of specified concentrations, and any of the prohibited phthalates in concentrations greater than 0.1 percent.

The cost of third party testing for lead can range from $5 per component part using X-ray fluorescence spectrometry (XRF) to more than $100 per component through Inductively Coupled Plasma testing (ICP). The cost of third party testing for the ASTM F963 elements ranges from around $60 in China, to up to around $190 in the United States using ICP and about $40 per component using high definition X-ray fluorescence spectrometry (HDXRF). The cost of third party testing for phthalates is approximately $125 to $350 per test, depending upon where the

testing is conducted and any applicable discounts.[33] Because one product might have several component parts that require testing, the cost to test a finished product for these regulated materials may be substantially higher. If small entities have lower production volumes than larger entities, these determinations would be expected to have a disproportionately beneficial impact on small entities because the costs of the tests are distributed over fewer units. Additionally, some laboratories may offer their larger customers discounts that might not be available to small entities that need fewer third party tests.

Although the cost of third party testing is relatively high on a per-test or per-product basis, the total amount by which the third party testing costs would be reduced cannot be estimated reliably with the information available. For example, although the number of manufacturers of children's products, children's toys, and child care articles is available from the U.S. Bureau of the Census, the number of manufacturers that actually use particleboard, hardwood plywood, or medium-density fiberboard in their products is unknown. Likewise, the number of children's products, children's toys, and child care articles that contain these EWPs is also unknown.

Although comprehensive estimates of the number of products that contain component parts made from the specified engineered woods are not available, there is some evidence that these EWPs are used in children's products, children's toys, and child care articles in items such as furniture, sporting goods, and musical instruments.

Based on the number of domestic toy manufacturers classified as small businesses by the U.S. Bureau of the Census and evidence that the specified EWPs are used in children's products, children's toys, and child care articles, staff believes that a substantial number of small entities could be affected positively by this regulation.

7 Questions for Public Comment

The staff is interested in obtaining more information on the following topics:

1. Are there any data or examples that indicate that the EWPs identified in the proposed rule can and do contain lead, the ASTM F963 elements, or prohibited phthalates at levels that are not compliant? Please provide data supporting your assertion.
2. The TERA Task 14 Report identified the use of some of the ASTM F963 elements as catalysts in adhesive formulations used to manufacture EWPs. Please provide any information that supports or refutes the claim that these elements will not be present in concentrations above their specified limits in EWPs.
3. CPSC staff has heard from a manufacturer of PVAc used in the manufacture of hardwood plywood that, while phthalates are no longer used in domestic production, they were once used. What phthalates were used in PVAc in the past? Could any of the specified

[33] The cost estimates of third party phthalate testing are based on information provided both by consumer product manufacturers and by testing laboratories.

phthalates be used? Why or why not? Are any of the specified phthalates used in domestic or international manufacturing of EWPs? Why or why not?

4. How can one determine if a hardwood plywood sheet contains a PVAc adhesive system? How can one determine whether a PVAc adhesive system used in the manufacture of hardwood plywood contains a specified phthalate in concentrations greater than the specified limits? Can this type of information be found on labels, SDSs, company websites, or some other way?
5. Other than PVAc, are there additional adhesive formulations used in the manufacture of EWPs that could contain the specified phthalates in concentrations greater than those specified? If yes, what phthalate is used and at what concentration?
6. Are there any post-consumer recycled EWPs that consistently comply with the limits for lead, ASTM F963 elements, or prohibited phthalates?
7. Please describe the methods used to determine whether post-consumer recycled material is used in the manufacture of EWPs? Can this type of information be found on labels, SDSs, company websites, or some other way?
8. In addition to particleboard, hardwood plywood, and medium-density fiberboard, are there other EWPs widely used in children's products, children's toys, and childcare articles that have not been identified in the proposed rule that do not, and will not, contain lead, the ASTM F963 elements, or prohibited phthalates? Please provide supporting data to show that these EWPs do not and will not contain lead, the ASTM F963 elements, or prohibited phthalates in concentrations above the mandatory limits?

8 Options for Future Commission Action Regarding Determinations on Particleboard, Hardwood Plywood, and Medium-Density Fiberboard

CPSC staff recommends publishing a notice of proposed rulemaking (NPR), regarding third party testing requirements for lead, the specified ASTM F963 elements, and the specified phthalates in the three engineered wood products, as described above.

The Commission could take one or more of the following actions:

- Direct staff to publish the NPR as drafted;
- Direct staff to publish the NPR with changes, as directed by the Commission;
- Direct staff to develop other documentation, such as Manufacturer Guidance; or
- Other actions the Commission decides.

9 Conclusions

CPSC contracted with TERA to conduct a literature review of the potential presence of lead, the ASTM F963 elements, or phthalates in three specified engineered wood products. TERA screened thousands of references identified by their multipronged search method for relevance to this issue. TERA believes their method generated a sample that is representative of all the

relevant references available. CPSC staff reviewed the information provided in the contractor report and formulated recommendations for Commission consideration.

10 References

Bösch, M., Jochem, D., Weimar, H., Dieter, M., 2015. Physical input-output accounting of the wood and paper flow in Germany. Resources, Conservation and Recycling 94, 99–109. doi:10.1016/j.resconrec.2014.11.014

Bradley, D., 2014. Wooden it be nice? X-raying contaminants [WWW Document]. Spectroscopy NOW. URL http://www.spectroscopynow.com/xray/details/ezine/145efd61285/Wooden-it-be-nice-X-raying-contaminants.html?tzcheck=1 (accessed 1.28.16).

Cameron, G.G., Clark, P.W., Bullock, A.T., 1987. Electron-spin-resonance studies of spin-labeled polymers .19. Spin-labeled polyvinyl acetate plasticized with dibutyl phthalate. British Polymer Journal 19(3-4): 287-289.

Colak, S., Nemli, G., Demirkir, C., Aydin, I., Demirel, S., 2011. Utilization Potential of Waste from Window Joints for Particleboard. Journal of Composite Materials 45, 29–37. doi:10.1177/0021998310371548

European Union (EU), 2004. The EU Ecolabel for Wooden Furniture. European Commission. URL http://ec.europa.eu/environment/ecolabel/documents/Wooden_furniture.pdf .

Fellin, M., Negri, M., Zanuttini, R., 2014. Multi-elemental analysis of wood waste using energy dispersive X-ray fluorescence (ED-XRF) analyzer. European Journal of Wood and Wood Products 72, 199–211. doi:10.1007/s00107-013-0766-4

Feng, Z., Kunyan, C., Jiamo, F., Guoying, S., Huifang, Y., 2002. Biodegradability of di(2-ethylhexyl) phthalate by Pseudomonas fluorescens FS1. Water Air and Soil Pollution 140(1-4): 297-305.

Geng, G., Miao, P., Wang, H., Zhao, C., Zhang, C., Zhao, Y., Xu, Y., University, C. of M.S. and E. of C., 2014. Synthesis and Characterization of Foaming Barium Phenolic Foam Resin. Polymer Materials Science & Engineering 20–23.

Hunt, Christopher. Personal Communication, 2017.

Ijeh, I., 2015. Recycling timber: Wasting away [WWW Document]. Building. URL http://www.building.co.uk/analysis/technical-case-studies/sustainable-projects/recycling-timber-wasting-away/5078393.article (accessed 1.28.16).

Jeffrey, C., 2011. Construction and demolition waste recycling: A literature review. Dalhousie University's Office of Sustainability, Resource and Recovery Fund Board of Nova Scotia, Nova Scotia, Canada.

Meijer, M.D., Flapper, J., 2013. Patent. (WO2014095670) Drier for auto-oxidisable coating compositions. AKZO NOBEL IP Department.

Munson, J.M., 1997. Reconstituted Particleboards from CCA Treated Red Pine. A thesis submitted to Michigan State University in partial fulfillment of the requirements for the degree of Master of Science. Department of Forestry, University of Michigan, Ann Arbor, MI.

Munson, J.M., Kamdem, D.-P., 1998. Reconstituted particleboards from CCA-treated red pine utility poles. Forest Products Journal 48, 55–62.

Peltola, J.S.P., Juhanoja, J., Salkinoja-Salonen, M.S., 2000. Biodegradability and waste behavior of industrial wood-based construction materials. Journal of industrial microbiology & biotechnology 24, 210–218.

Popov, V.A., Smirenskaya, E.E., Cherkinskaya, K.T., Smirnov, R.N., 1973. Influence of metals on the composition of the carbonisation products of phenolic foams. Sov Plast 57–59.

Rowell, R.M., 2011. Contaminants in recycled wood. In *AccessScience*. McGraw-Hill Education. URL http://dx.doi.org/10.1036/1097-8542.YB110015.

Shrivastava, S., Srivastava, A.K., Singh, B., Shah, D., Verma, A.K., Gutch, P.K., 2012. Study on phenolic resin beads: Effect of reaction parameters on the properties of polymeric beads. J. Appl. Polym. Sci. 123, 3741–3747. doi:10.1002/app.34705

UN, 2009. Globally Harmonized System of Classification and Labelling of Chemicals. Part 1, Introduction. United Nations.

USDA, 2010. Wood Handbook: Wood as an Engineering Material. Centennial Edition United States Department of Agriculture, Forest Service, Forest Products Laboratory. General Technical Report FPL-GTR-190.

Wang, J., Zhang, Y.F., 2011. The Study of Divalent Metal Ion Catalysts on Phenol-Formaldehyde Resol Resins. Applied Mechanics and Materials 71-78, 818. doi:http://dx.doi.org/10.4028/www.scientific.net/AMM.71-78.818

Wang, Q.-Y., Yang, X.-G., Ma, F., Yao, J., 2013. Solvent-free thermal decomposition of methylenediphenyl di(phenylcarbamate) catalyzed by Sb2O3. Journal of Molecular Catalysis 27, 205–211.

Zhang, X., Ma, Q., Zhang, Z., Peng, W., Zhang, M., 2009. Effect of nano BaCO3 on pyrolytic reaction of phenol-formaldehyde resin. p. 74933A–74933A–5. doi:10.1117/12.834692

Tab A: Initial Regulatory Flexibility Analysis

Draft Initial Regulatory Flexibility Analysis

Directorate for Economic Analysis

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
BETHESDA, MD 20814

Memorandum

Date: August 15, 2017

TO: Jacqueline Campbell, Project Manager, Directorate for Engineering Sciences, Office of Hazard Identification and Reduction

THROUGH: Gregory B. Rodgers, Ph.D., Associate Executive Director
Robert L. Franklin, Senior Staff Coordinator
Directorate for Economic Analysis

FROM: Charu S. Krishnan
Directorate for Economic Analysis

SUBJECT: **Recommendation for Determinations Regarding Third Party Testing of Engineered Wood Products for Lead, ASTM F963 Elements, and Phthalates**

Background

The Commission is considering a draft proposed rule that would establish determinations that three engineered wood types do not contain lead in concentrations exceeding 100 ppm, any of the specified ASTM F963 elements (Sb, As, Ba, Cd, Cr, Pb, Hg, Se)[1] in excess of specified concentrations, and any of the specified phthalates (DEHP, DBP, BBP, DINP, DIDP, or DnOP)[2] in concentrations greater than 0.1 percent (1000 ppm). If the Commission makes these determinations, manufacturers of children's products, children's toys, and child care articles will not have to obtain passing third party test results for accessible component parts made of these engineered woods in order to certify that the component parts do not contain lead, the ASTM F963 elements, or the specified phthalates in excess of allowable levels.

The three engineered woods for which the determinations would be made are particleboard, hardwood plywood, and medium-density fiberboard. Based on an extensive literature review seeking information on the raw materials used in the manufacture of the

[1] Sb: Antimony, As: Arsenic, Ba: Barium, Cd: Cadmium, Cr: Chromium, Pb: Lead, Hg: Mercury, Se: Selenium
[2] DEHP: di-(2-ethylhexyl) phthalate, DBP: dibutyl phthalate, BBP: benzyl butyl phthalate, DINP: diisononyl phthalate, DIDP: diisodecyl phthalate, DnOP: di-n-octyl phthalate. Four additional phthalates (DIBP: diisobutyl phthalate, DPENP: di-n-pentyl phthalate, DHEXP: di-n-hexyl phthalate, DCHP: dicyclohexyl phthalate) were researched to support any potential changes to the determinations if the Phthalates Rule is finalized.

specified engineered woods, the worldwide manufacturing practices of the engineered woods, the typical applications, and the potential for exposure to lead, the ASTM F963 elements, and the specified phthalates through the use of recycled materials or due to contamination, CPSC staff has concluded that there is a high degree of assurance that certain of these three engineered woods in an untreated and unfinished state made from virgin or pre-consumer wood waste[3] will not contain lead, the ASTM F963 elements, and the specified phthalates in excess of allowable levels. Therefore, accessible component parts made from such engineered wood in children's products, children's toys, and child care articles subject to sections 101(regarding lead content of children's products), 106 (mandating the ASTM F963 toy standard) and 108 (regarding the use specific phthalates in children's toys and child care articles) of the Consumer Product Safety Improvement Act would not require third party testing for certification purposes. The draft proposed rule is one result of the Commission's ongoing efforts to find opportunities to reduce the cost of third party testing requirements that are consistent with assuring compliance with the applicable children's product safety rules.

Whenever an agency is required to publish a proposed rule, the Regulatory Flexibility Act (5 U.S.C. §§ 601 – 612) requires that the agency prepare an initial regulatory flexibility analysis (IRFA) that describes the impact that the rule would have on small businesses and other entities, unless the agency certifies that the rule will not have significant economic impact on a substantial number of small entities. The initial regulatory flexibility analysis must contain:

(1) a description of why action by the agency is being considered;
(2) a succinct statement of the objectives of, and legal basis for, the proposed rule;
(3) a description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;
(4) a description of the projected reporting, recordkeeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record; and
(5) an identification to the extent practicable, of all relevant Federal rules which may duplicate, overlap or conflict with the proposed rule.

The IRFA also must describe any significant alternatives to the proposed rule which would accomplish the stated statutory objectives and minimize any significant economic impact of the proposed rule on small entities.

[3] An untreated EWP does not have any additional finishes applied at manufacture such as flame retardants or rot resistant finishes. The TERA Task 14 report explains that an unfinished EWP does not have any surface treatments applied at manufacture, such as factory-applied coatings. The term *virgin wood* describes wood logs, fibers, chips, or layers that have not been recycled from a previous use. The term *pre-consumer wood waste* describes wood logs, fibers, chips, or layers that have been recycled from an industrial process before being made available for consumer use. Examples of this type of waste include trimmings from EWP panel manufacturing, sawdust from cutting logs, or remaining wood pieces from sawing a log into framing lumber. The term *post-industrial wood waste* may also be used.

According to the Small Business Administration's (SBA) Office of Advocacy,

> Congress considered the term 'significant' to be neutral with respect to whether the impact is beneficial or harmful to small businesses. Therefore, agencies need to consider both beneficial and adverse impacts in an analysis.[4]

The SBA guidance may seem counterintuitive in that burden reduction, although beneficial, could still be found to have a significant economic impact on a substantial number of small businesses. However, the SBA guidance states, "…an agency cannot certify a proposed rule if the economic impact will be significant but positive."[5] Therefore, although the impact of the draft proposed rule on small entities would be entirely beneficial, staff has prepared an initial regulatory flexibility analysis.

Objectives and Legal Basis of the Draft Proposed Rule

The objective of the draft proposed rule is to reduce the burden of third party testing on manufacturers of children's products, children's toys, and child care articles consistent with assuring compliance with CPSC requirements. The legal basis is section 2 of Public Law 112-28.

Small Entities to Which the Draft Proposed Rule Would Apply

The proposed rule would apply to small entities that manufacture or import children's products, children's toys, and child care articles that contain particleboard, hardwood plywood, or medium-density fiberboard. Children's products are defined as consumer products designed or intended primarily for children 12 years of age or younger. Children's toys can include dolls, toys, and games. Child care articles are those which are designed or intended by the manufacturer for a child age three years old or younger to facilitate sleeping or feeding or to help the child in sucking or teething.

The following tables show the number of firms classified in the North American Industrial Classification System (NAICS) categories that are most likely to include manufacturers of children's products that could be subject to one or more children's product safety rules. However, it is doubtful that all of the firms in some of these categories produce children's products. Moreover, of those firms that do produce children's products, we do not know how many of the firms manufacture products with accessible particleboard, hardwood plywood, or medium-density fiberboard component parts. The numbers of small firms are based on the SBA criteria for each NAICS code. In some cases, the size standards are not in line with the size categories provided by the Census Bureau. In these cases, we use judgment to determine the appropriate category to use; these criteria are noted in the tables below.

Table 1 presents the number of domestic manufacturers by NAICS code that could

[4] SBA Office of Advocacy "A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act", May 2012, p. 23
[5] Id. p.20

manufacture children's products, children's toys, or child care articles that may contain accessible particleboard, hardwood plywood, or medium-density fiberboard component parts and would be responsible for the certification of these products[6]. In total, there are 7,059 firms that can be categorized as small. Of these, 3,705 have fewer than 5 employees.

Table 1. Number of Domestic Manufacturing Firms in Relevant Product Categories, 2014

NAICS Code	Description	SBA Size Standard (Number of Employees)	Criteria Used for "Small" (Number of Employees)	Total Number of Firms	Number of Small Firms	Firms with <5 employees
33712	Household and Institutional Furniture Manufacturing	Ranging from <500 to <1,000	<500	4,384	4,314	2,197
33992	Sporting and Athletic Goods Manufacturing	<750	<500	1,644	1,618	830
33993	Doll, Toy, and Game Manufacturing	<500	<500	556	548	339
339992	Musical Instrument Manufacturing	<1,000	<500	584	579	339
	Total Manufacturers			**7,168**	**7,059**	**3,705**

Source: U.S. Department of Commerce, Bureau of the Census, 2014 SUSB Annual Data Tables by Establishment Industry, *Number of Firms, Number of Establishments, Employment, and Annual Payroll by Enterprise Employment Size for the United States, All Industries: 2014*. Release date: 09/29/2016 (available at: https://www2.census.gov/programs-surveys/susb/tables/2014/us_6digitnaics_2014.xlsx.)

Table 2 presents the number of domestic wholesalers by NAICS code that could distribute children's products, children's toys, or child care articles that may contain accessible particleboard, hardwood plywood, or medium-density fiberboard component parts. In total, there are 26,113 firms that can be categorized as small. Of these, 15,947 have less than 5 employees. Wholesalers who obtain their products strictly from domestic manufacturers or from other wholesalers would not be impacted by the rule because the manufacturer or importer would be responsible for certifying the products.[7] Although importers are responsible for the certification of the children's products that they import, they may rely upon third party testing performed by their foreign suppliers for purposes of certification. The number of small wholesalers that import children's products, children's toys, or childcare articles as opposed to obtaining their product

[6] See 16 C.F.R. § 1110.7.
[7] See 16 C.F.R. § 1110.7.

from domestic sources is not known. Also unknown is the number of small importers that must obtain or pay for the third party testing of their products.

Table 2. Number of Domestic Wholesalers in Relevant Product Categories, 2014

NAICS Code	Description	SBA Size Standard (Number of Employees)	Criteria Used for "Small" (Number of Employees)	Total Number of Firms	Number of Small Firms	Firms with < 5 employees
4232	Furniture and Home Furnishing Merchant Wholesalers	<100	<100	10,571	10,165	5,559
42391	Sporting and Recreational Goods and Supplies Merchant Wholesalers	<100	<100	5,136	4,971	3,115
42392	Toy and Hobby Goods and Supplies Merchant Wholesalers	<150	<100	2,033	1,959	1,193
42399	Other Miscellaneous Durable Goods Merchant Wholesalers	<100	<100	9,242	9,018	6,080
	Total Wholesalers			**26,982**	**26,113**	**15,947**

Source: U.S. Department of Commerce, Bureau of the Census, 2014 SUSB Annual Data Tables by Establishment Industry, *Number of Firms, Number of Establishments, Employment, and Annual Payroll by Enterprise Employment Size for the United States, All Industries: 2014*. Release date: 09/29/2016. (available at: https://www2.census.gov/programs-surveys/susb/tables/2014/us_6digitnaics_2014.xlsx.)

Table 3 presents the number of domestic retailers by NAICS code that could sell children's products, children's toys, or child care articles that may contain accessible particleboard, hardwood plywood, or medium-density fiberboard component parts. In total, there are 49,358 firms that can be categorized as small. Of these, 27,506 have less than 5 employees. Although there are almost 50,000 retailers in the NAICS categories summarized in Table 3, the only retailers that would be directly impacted by the draft proposed rule are those that import children's products themselves. Retailers that obtain all of their products from domestic manufacturers or wholesalers will not be directly impacted by the rule because the manufacturers

or wholesalers would be responsible for certifying the products.[8]

Table 3. Number of Domestic Retailers in Relevant Product Categories, 2012

NAICS Code	Description	SBA Size Standard (Avg Annual Receipts, $m)	Criteria Used for "Small" (Avg Annual Receipts, $m)	Total Number of Firms	Number of Small Firms	Firms with Avg Annual Receipts < $1m
442110	Furniture Stores	<$20.5m	<$25m	20,768	20,629	10,366
451110	Sporting Goods Stores	<$15m	<$10m	17,951	17,177	10,553
451120	Hobby, Toy, and Game Stores	<$27.5m	<$25m	7,147	7,142	4,124
451140	Musical Instrument and Supplies Stores	<$11m	<$10m	3,492	3,457	2,463
	Total Retailers			**49,358**	**48,405**	**27,506**

Source: U.S. Department of Commerce, Bureau of the Census, 2012 Economic Census of the United States, *Retail Trade: Subject Series- Estab & Firm Size: Summary Statistics by Employment Size of Establishments for the U.S.: 2012*. Release date: 02/05/2016. (available at: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk.)
Note: 2012 is the most recent Economic Census data available. The Economic Census is only conducted every five years and the next data will not be available until the completion of the 2017 Economic Census.

While comprehensive estimates of the number of children's products, children's toys, and child care articles that contain component parts made from the specified engineered woods are not available, there is evidence that these engineered woods are used in children's furniture, sporting equipment, children's toys, and some musical instruments. Based on the number of domestic toy manufacturers that are classified as small businesses by the U.S. Bureau of the Census and evidence that the specified engineered woods are used in children's products, children's toys, and child care articles, staff believes a substantial number of small entities would be impacted by this regulation.

Reporting, Recordkeeping and Other Compliance Requirements and Impact on Small Businesses

CPSC staff recommends, with some exceptions (listed below), that the Commission

[8] See 16 C.F.R. § 1110.7.

determine that the following three EWPs be determined not to contain lead, the ASTM F963 elements, and the specified phthalates (DEHP, DBP, BBP, DINP, DIDP, or DnOP) in concentrations greater than their specified limits. If the Commission promulgates a rule making the determinations, manufacturers, importers, and private labelers of children's products, children's toys, and child care articles that have accessible component parts that consist of these engineered woods would not require third party testing for certification that these components comply with the lead, ASTM F963 elements, or phthalate requirements. The staff recommendations for determinations for the specific engineered woods are as follows:

- Particleboard that is untreated and unfinished made from virgin or pre-consumer wood waste, should be determined not to contain:
    - Lead in concentrations greater than 100 ppm;
    - Any of the ASTM F963 elements in concentrations greater than their specified solubility limits; or
    - Any of the 10 phthalates researched in concentrations greater than 0.1 percent.
- Hardwood plywood that is untreated and unfinished made from virgin or pre-consumer wood waste, should be determined not to contain:
    - Lead in concentrations greater than 100 ppm; or
    - Any of the ASTM F963 elements in concentrations greater than their specified solubility limits.
    - Any of the 10 phthalates researched in concentrations greater than 0.1 percent if the hardwood plywood does not use polyvinyl acetate as an adhesive system.
- Medium-density fiberboard that is untreated and unfinished made from virgin or pre-consumer wood waste, should be determined not to contain:
    - Lead in concentrations greater than 100 ppm;
    - Any of the ASTM F963 elements in concentrations greater than their specified solubility limits; or
    - Any of the 10 phthalates researched in concentrations greater than 0.1 percent.

The draft proposed rule would not impose any reporting, recordkeeping, or other compliance requirements on small entities. In fact, because the draft proposed rule would eliminate a testing requirement, there would be a small reduction in some of the recordkeeping burden under 16 C.F.R. parts 1107 and 1109 because manufacturers would no longer have to maintain records of third party tests for the component parts manufactured from these engineered woods for lead, the ASTM F963 elements, or the specified phthalates.

The impact of the determinations on small businesses would be to reduce the burden of third party testing for the content of lead, the ASTM F963 elements, and the specified phthalates and would be expected to be entirely beneficial. The cost of lead testing ranges from $50 to more than $100 per component through Inductively Coupled Plasma testing (ICP). If one uses X-ray fluorescence (XRF) spectrometry, which is an acceptable method for certification of third-party testing for lead content, the costs can be greatly reduced to approximately $5 per component. If a component part made with one of the specified engineered woods is painted, the component part would be exempt from the third party testing requirement, but the paint would still require lead testing.

Based on published invoices and price lists, the cost of a third party test for the ASTM F963 elements ranges from around $60 in China, up to around $190 in the United States using ICP. This cost can be greatly reduced with the use of high definition X-ray fluorescence spectrometry (HDXRF), which is an acceptable method for certification of third-party testing for the presence of the ASTM elements. The cost can be reduced to about $40 per component. It should be noted that lead is one of the ASTM elements, so this testing would also cover the cost of lead testing for component parts.

The cost of phthalate testing is relatively high: between about $125 and $350 per component, depending upon where the testing is conducted and any discounts that are applicable. Because one product might have multiple components that require testing, the cost of testing a single product for phthalates could exceed $1,000 in some cases.

Moreover, more than one sample might have to be tested to provide a high degree of assurance of compliance with the requirements for testing. To the extent that small businesses have lower production or sales volumes than larger businesses, these determinations would be expected to have a disproportionately beneficial impact on small businesses. This beneficial impact is due to spreading the costs of the testing over fewer units; and the benefit of the Commission making the determinations would be greater on a per unit basis for small businesses. Additionally, some testing laboratories may offer their larger customers discounts that might not be available to small businesses that need fewer third party tests. Making the determinations for these engineered woods could potentially significantly benefit a substantial number of firms.

On the other hand, there are reasons to believe that the benefit of making the determinations could be less than might be expected. For example, some firms might have been able to substantially reduce their third party testing costs by using component part testing as allowed by 16 C.F.R. 1109, so the marginal benefit that might be derived from making the determinations might be low. Also, some firms have reduced their testing costs by using XRF or HDXRF technology, which is less expensive than ICP, and would reduce the marginal benefit of these determinations.

Based on staff's research, the burden reduction from this determination rule could result in testing cost reductions that exceed 1 percent of the gross revenues for a substantial number of manufacturers, importers, or retailers of the relevant product categories.

CPSC staff welcomes public comments on the potential impact of the draft proposed rule on small entities. Comments are especially welcome on the following topics:

- The extent to which particleboard, hardwood plywood, and medium-density fiberboard are used in children's products, children's toys, and childcare articles, especially those manufactured or imported by small firms;
- The potential reduction in third party testing costs that might be provided by the Commission making the determinations, including the extent to which component part testing is already being used and the current cost of testing components made from these

engineered woods for compliance with the lead, ASTM elements, and phthalate requirements;

- Any situations or conditions in the draft proposed rule that would make it difficult to make use of the determinations to reduce third party testing costs; and
- Although the CPSC staff expects that the impact of the draft proposed rule will be entirely beneficial, any potential negative impacts of the draft proposed rule.

Federal Rules Which May Duplicate, Overlap or Conflict with the Draft Proposed Rule

We have not identified any Federal rules that duplicate or conflict with the draft proposed rule.

Steps the Agency Has Taken to Minimize the Significant Impact on Small Entities

Under section 603(c) of the Regulatory Flexibility Act, an initial regulatory flexibility analysis should "contain a description of any significant alternatives to the proposed rule which accomplish the stated objectives of the applicable statutes and which minimize any significant impact of the proposed rule on small entities." The draft proposed rule is itself the result of efforts of the CPSC to reduce third party testing costs consistent with assuring compliance with all applicable consumer product safety rules. Because the proposed rule is itself intended to reduce the cost of third party testing on small businesses and will not impose any additional burden, the staff did not consider alternatives to this draft proposed rule that would minimize the impact of the rule.