ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 745

[OPPTS–62156; FRL–5791–9]

RIN 2070–AC63

Lead; Identification of Dangerous Levels of Lead

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of proposed rulemaking.

SUMMARY: In accordance with section 403 of the Toxic Substances Control Act (TSCA), as amended by the Residential Lead-Based Paint Hazard Reduction Act of 1992, also known as ''Title X,'' EPA is proposing a regulation to establish standards for lead-based paint hazards in most pre-1978 housing and child-occupied facilities. This proposed regulation is a focal point of the Federal lead program and supports the implementation of regulations already promulgated and others under development which deal with worker training and certification, lead hazard disclosure in real estate transactions, requirements for lead cleanup under State authorities, lead hazard evaluation and control in Federally-owned and Federally-assisted housing, and U.S. Department of Housing and Urban Development (HUD) grants to assist in lead hazard abatement. In addition, today's action also proposes, under the authority of TSCA section 402, residential lead dust cleanup levels and amendments to dust and soil sampling requirements and, under the authority of TSCA section 404, amendments to State program authorization requirements. By supporting the implementation of the national lead program, this proposed regulation would help to prevent lead poisoning in children under the age of 6.

DATES: Written comments in response to this proposed rule must be received on or before September 1, 1998.

ADDRESSES: Each comment must bear the docket control number OPPTS–62156. All comments should be sent in triplicate to: OPPT Document Control Officer (7407), Office of Pollution Prevention and Toxics, Environmental Protection Agency, 401 M St., SW., Rm. G099, East Tower, Washington, DC 20460.

Comments and data may also be submitted electronically to: oppt.ncic@epamail.epa.gov. Follow the instructions under Unit X. of this document. No Confidential Business Information (CBI) should be submitted through e-mail.

All comments which contain information claimed as CBI must be clearly marked as such. Three copies, sanitized of any comments containing information claimed as CBI, must also be submitted and will be placed in the public record for this rulemaking. Persons submitting information, any portion of which they believe is entitled to treatment as CBI by EPA, must assert a business confidentiality claim in accordance with 40 CFR 2.203(b) for each such portion. This claim must be made at the time that the information is submitted to EPA. If a submitter does not assert a confidentiality claim at the time of submission, EPA will consider this as a waiver of any confidentiality claim and the information may be made available to the public by EPA without further notice to the submitter.

If requested, EPA will schedule public meetings where oral comments will be heard. EPA will announce in the **Federal Register** the time and place of any public meetings. Oral statements will be scheduled on a first come first served basis by calling the telephone number listed in the **Federal Register** notice that announces these meetings. All statements will be made part of the public record and will be considered in the development of the final rule.

FOR FURTHER INFORMATION CONTACT: For general information contact: National Lead Information Center's Clearinghouse, 1-800-424-LEAD(5323). For specific technical and policy questions contact: Jonathan Jacobson, (202) 260-3779; jacobson.jonathan@epamail.epa.gov.

SUPPLEMENTARY INFORMATION:

I. Overview

This overview identifies entities potentially affected by the rule, summarizes the proposed rule, describes the uses and key limitations of the proposal's scope, and provides a roadmap of the preamble.

A. Regulated Entities

The following table identifies the entities that would be involved in the implementation of regulations that would be affected by today's proposal and the effect of the proposal on implementation of those regulations.

Category	Examples of Entities	Effect of Proposal
Lead abatement professionals	Workers, supervisors, inspectors, risk assessors, and project designers engaged in lead-based paint activities	Provides standards that risk assessors would use to identify hazards and evaluate clearance tests; helps determine when certified professionals would be required to perform abatements
Training providers	Firms providing training services in lead-based paint activities	Provides standards that training providers would have to teach in their courses
HUD and other Federal agencies that own residential property		Proposed standards identify hazards that Federal agencies would have to abate in pre-1960 housing prior to sale
Property owners who receive assistance through Federal housing programs	State and city public housing authorities, owners of multi-family rental properties who receive project-based assistance, owners of rental properties who lease units under HUD's tenant-based assistance program	Proposed standards identify hazards that property owners would have to abate or reduce as specified by regulations currently be developed by HUD under authority of Title X, section 1012
Property owners	Owner occupants, rental property owners, public housing authorities, Federal agencies	Proposed standards identify hazards that would have to be disclosed under EPA/HUD joint regulations promulgated under Title X, section 1018

This table is not intended to be exhaustive, but rather provides a guide for readers likely to be affected by this action through implementation of the elements of the programs discussed in this proposal. To determine whether you, your business, or your agency is affected, you should carefully examine the Requirements for Lead-Based Paint Activities at 40 CFR part 745, subpart L and subpart Q and Lead-Based Paint Disclosure at 40 CFR part 745, subpart F and 24 CFR part 35, subpart H. The regulations covering evaluation and control of lead-based paint hazards in HUD-associated and Federally-owned housing are currently under development. Proposed regulations were published in the **Federal Register** on June 7, 1996 (61 FR 29169). If you have any questions regarding the applicability of this action to a particular entity, consult the person listed in the ''FOR FURTHER INFORMATION CONTACT'' section.

B. Summary of the Proposed Rule

1. *Lead-Based Paint Hazard Standards*. EPA is proposing the amendments in this document primarily under the authority of section 403 of TSCA. Section 403 requires EPA to promulgate regulations that ''identify . . . lead-based paint hazards, lead-contaminated dust and lead-contaminated soil'' for purposes of the entire Title X which includes Title IV of TSCA. Lead-based paint hazards, under TSCA section 401, 15 U.S.C. 2681, are defined as of conditions of lead-based paint and lead-contaminated dust and soil that ''would result'' in adverse human health effects (15 U.S.C. 2681(10)). Lead-based paint hazards from all three sources apply to target housing (i.e., most pre-1978 housing) and child-occupied facilities.

The proposed standard for the paint component, called hazardous lead-based paint, is lead-based paint in poor condition. Paint in poor condition is defined as more than 10 square feet (ft^2) of deteriorated paint on exterior components with large surface areas, more than 2 ft^2 of deteriorated paint on interior components with large surface areas (e.g., walls, ceilings, floors), or deteriorated paint more than 10 percent of the total surface area of exterior or interior components with small surface areas (e.g., trim, baseboards). The proposed standards for dust-lead hazards are the average levels of lead in dust that equals or exceeds 50 micrograms per square foot ($\mu g/ft^2$) on uncarpeted floors and 250 $\mu g/ft^2$ on interior window sills. The proposed standard for soil-lead hazards is the total lead that equals or exceeds 2,000 parts per million (ppm) based on a yard-wide average soil-lead concentration rather than maximum or worst-case values.

Although the proposed regulation does not require property owners to respond to the presence of lead-based paint hazards, EPA would recommend that appropriate measures should be taken, commensurate with the risk reduction achieved, to reduce or eliminate the hazards. Small amounts of hazardous lead-based paint can be addressed by repairing deteriorated paint. Larger amounts of hazardous lead-based paint should be abated, meaning that the paint can be removed from the component, the component can be replaced, or the paint can be enclosed.

Dust-lead hazards should be addressed through intensive cleaning. If household surfaces are smooth and cleanable, regular household cleaning can probably maintain acceptably low levels of lead in dust in the absence of any event (e.g., remodeling project) that reintroduces large amounts of dust contaminated with lead. Soil-lead hazards should be eliminated. Currently available options include soil removal and permanently covering the soil (i.e., paving).

In addition, this document proposes to identify a soil-lead level of concern of 400 ppm based on a yard-wide average, which represents a level at which risk should be communicated to the public as compared to the more active risk reduction measures recommended for hazards. This level will not be included in the regulation because it would impose no legally recognizable requirements on any person or entities subject to this regulation. Nevertheless, if a soil-lead hazard is not present, but lead in soil exceeds the level of concern, EPA recommends that low cost measures, which may be sufficient to reduce exposure, be implemented. These measures include but are not limited to covering bare soil, placement of washable doormats, more frequent washing of hands and toys, and access restrictions. Access restrictions should only be used if there are other parts of the yard that are available to the residents.

EPA is planning to develop a guidance document to accompany the final regulation that will explain these recommended responses to lead-based paint hazards and the soil-lead level of concern in greater detail.

It is important to note that the proposed standards are intended to be used prospectively. That is, they should be used to identify properties that present risks to children before children are harmed. These standards would not be appropriate to use when identifying the sources of exposure for a lead-poisoned child. When a property is being evaluated in response to the identification of a lead-poisoned child, the risk assessor in cooperation of a local public health official should identify and consider all sources of lead exposure.

The proposed TSCA section 403 standards are based on the best data and analytical tools currently available to the Agency. EPA expects that the standards may need to be modified over time as better tools and data become available. The Agency, however, believes that issuing standards now, even in the face of considerable uncertainty, is consistent both with the public's need for information from EPA and the statutory intent to develop standards with currently available information.

In this document, EPA is also proposing amendments to the existing rules issued under TSCA sections 402 and 404, including: (1) Requirements for interpreting the results of sampling of lead materials for purposes of assessing risk; (2) clearance standards for cleaning up hazardous lead dust of 50 $\mu g/ft^2$ for uncarpeted floors, 250 $\mu g/ft^2$ for interior window sills, and 800 $\mu g/ft^2$ for window troughs; (3) amendments to the dust and soil sampling locations in the risk assessment work practice standards at 40 CFR 745.227; (4) work practice standards for the management of soil removed during a soil abatement; and (5) amendments to the State and Tribal program authorization requirements under 40 CFR part 745, subpart Q.

C. Uses of the Standards

The TSCA section 403 standards support implementation of key provisions of Title X which would require action with respect to lead-based paint hazards by both private parties and the government, principally for EPA and programs under the auspices of the Department of Housing and Urban Development (HUD). These provisions include eligibility criteria for the Department of Housing and Urban Development's (HUD) lead hazard control grant program (section 1011 of Title X), which authorizes grants to clean up lead-based paint hazards. In addition, Title X imposes certain requirements on owners of HUD-associated housing (section 1012 of Title X) and Federal agencies selling residential properties they own to evaluate and control lead-based paint hazards (section 1013 of Title X). Sellers and lessors of housing built before 1978 have obligations to disclose known lead-based paint and lead-based paint hazards prior to sale or rental (section 1018 of Title X). Regulations also impose requirements to use certified workers for evaluation and cleanup of lead-based paint hazards (section 402 of TSCA). These provisions are described in more detail in Unit VIII. of this preamble.

EPA does note, however, that the regulations would not require private property owners to undertake hazard control actions when hazards are identified. Instead, EPA expects that concern about children's health, liability exposure and other market forces will provide incentive for property owners to take action voluntarily.

In addition to their applicability within Title X, EPA anticipates that the TSCA section 403 regulations will have broader uses. The proposed regulations will play a significant role in public education, communicating the Agency's best judgment concerning the identification of lead-based paint hazards to property owners, State and local officials, tenants, and other decision-makers. EPA also expects that public and private institutions may incorporate the standards into State and local laws, housing codes, and lending and insurance underwriting standards.

D. Limitations of the Proposed Rule

During the regulatory development process, it became clear that significant confusion and uncertainty exists about the requirements and purpose of the TSCA section 403 regulations. To address this confusion and uncertainty, EPA wishes to highlight the major limitations and other issues related to the scope and use of today's proposal.

First, this proposal does not establish a new definition for lead-based paint, defined by statute as paint with lead levels equal to or exceeding 1.0 milligrams per square centimeter (mg/cm^2) or 0.5 percent by weight (see section 302(c) of the Lead-Poisoning Prevention Act, 42 U.S.C. 4822(c) and TSCA section 401(9)). Under Title X, only the Secretary of Housing and Urban Development has the authority to change the standard for lead-based paint in target housing (see TSCA section 401(9)). Title IV provides EPA the authority to change the standard only for lead-based paint in non-residential applications (e.g., public and commercial buildings, steel structures) (see TSCA section 401(9)). This proposal does not include any changes to this statutory definition.

Second, the proposed standards are intended to identify lead-based paint hazards when the lead-based paint risk assessment is performed. Because the conditions of lead-based paint and the levels of lead in dust and soil are constantly changing, the results of the risk assessment communicate conditions at the time the measurements are taken and the observations made. The proposed standards do not address the potential for hazards to develop. EPA recognizes, however, that potential hazards (e.g., intact lead-based paint on a ceiling) may become actual hazards as conditions change over time. Periodic reevaluation of a property would enable a property owner to determine whether potential hazards have become actual hazards. Recommendations concerning reevaluation will be provided in a separate guidance document that EPA is planning to issue.

Third, because the TSCA section 403 standards are established for the purposes of Title X and TSCA Title IV, they do not apply to housing and facilities occupied by children built during or after 1978, as well as some pre-1978 housing that is not included in the definition of target housing (e.g., 0-bedroom dwellings). EPA recognizes, however, that property owners and other decision-makers may be concerned about the presence of elevated levels of lead in dust and soil in housing and facilities occupied by children not covered by the standards. In such cases, EPA encourages these owners and decision-makers to use the standards to help determine whether actions should be taken to reduce risks to young children.

Fourth, the proposed regulations do not set standards that can be used to identify housing that is free from risks associated with exposure to lead. Such standards would be difficult to define, unworkable in practice, and inconsistent with the intent of Title X. Virtually all target housing has some lead present in paint, dust, and/or soil, which, under certain circumstances, may present risk to children. Furthermore, these risks often will depend on circumstances that may change quickly, such as the physical condition of the property. Thus, housing that presents minimal risks when examined may present substantial risks later.

E. Preamble Overview

The remainder of this preamble consists of eleven units. Unit II. provides background information, including: a description of the residential lead-based paint problem; Title X as a legislative response; key aspects of the regulatory development process; and the Agency's general standard-setting approach. Unit III. is a section-by-section review of the proposed regulatory provisions. Unit IV. presents EPA's interpretation of the statutory authority for the proposed TSCA section 403 standards, the Agency's policy basis for the proposed standards, and EPA's decisions for the proposed TSCA section 403 standards. This unit includes a summary of the technical analyses conducted by the Agency to support these decisions. Unit V. discusses a range of issues that affected EPA's decision-making during the regulatory development process. Unit VI. presents EPA's rationale and decisions for requirements on comparing risk assessment sampling results to the TSCA section 403 standards. Unit VII. describes the Agency's rationale and decisions concerning clearance standards and other amendments to the TSCA section 402 regulations related to work practice standards and TSCA section 404 regulations concerning EPA authorization of State and Tribal programs. Unit VIII. describes the effect that today's proposal will have on other Title X regulations and programs, and Unit IX. discusses the relationship between the proposed regulations and other EPA programs. Unit X. provides information on the public record supporting this regulation (''the docket''). Unit XI. presents the bibliographic references cited in the preamble, which are also part of the docket. Unit XII. presents a summary of the regulatory assessment analyses and Agency determinations conducted in response to various Federal laws and Executive orders concerning the public health and economic impact of the proposed regulation.

II. Background

A. Nature of the Problem

Elemental lead is a heavy, soft, and malleable bluish metal that has been used for thousands of years. Its favorable physical and chemical properties account for its versatility and extensive use in many common products including lead acid batteries, ammunition, chemicals (e.g., plastic stabilizers, pigments, and ceramic glazes), alloys (e.g., solder in piping and electronics), pipe/sheet lead, and radiation and cable sheathing. Centuries of mining, smelting, and use have released millions of tons of lead into the environment. With no known or foreseeable technology to render anthropogenic sources of environmental lead harmless, it remains ubiquitous in air, water, soil, dust, and in older homes and commercial structures. As a result, practically all people have some exposure to lead of anthropogenic origin.

Lead affects virtually every system of the human body. Exposure to high doses of lead can cause coma, convulsions, and even death. Exposure to low levels of lead can cause harm gradually and imperceptibly, with no obvious symptoms. In adults, chronic exposure to low levels of lead may cause memory and concentration problems, hypertension, cardiovascular disease, and damage to the male reproductive system. Exposure to lead before or during pregnancy can alter fetal development and cause miscarriages. A more detailed description of the health effects of lead can be found in Chapter 2 of the Risk Analysis to Support Standards for Lead in Paint, Dust, and Soil, which can be found in the public record for this proposal (Ref. 1).

While potentially harmful to individuals of all ages, lead exposure is especially harmful to children. Their rapidly developing nervous systems are particularly sensitive to the effects of lead. In addition, children absorb a greater portion of the lead to which they are exposed than adults do. Excessive exposure to lead in children causes learning disabilities, lower intelligence, behavioral problems, growth impairment, permanent hearing and visual impairment, and other damage to the brain and nervous system.

The concentration of lead in a child's blood is typically used as an index of lead exposure. As recent studies have identified previously unrecognized effects of exposure to lead at lower levels, there has been increasing concern about blood-lead levels once thought to be safe. Since 1975, the Centers for Disease Control and Prevention (CDC) have lowered the blood-lead level considered elevated for children from 40 µg/dl (micrograms per deciliter) to 10 µg/dl (Ref. 2). Although the scientific community has not been able to identify a threshold of exposure below which adverse health effects do not occur, the evidence of health effects below 10 µg/dl is not sufficiently strong to warrant concern.

Ingestion of lead-contaminated dust and soil through normal hand-to-mouth activity appears to be the primary pathway of lead exposure to U.S. children under 6 years of age. (Refs. 3 and 4.), Dust is contaminated by lead when: lead-based paint deteriorates; lead-based paint is disturbed in the course of renovation, repair, or abatement activity; or lead is tracked into, blown into, or otherwise enters the home from soil in the yard or other external sources (e.g., workplace). Soil contaminated with lead from deterioration of exterior lead-based paint, industrial emissions, and/or deposition of lead from past use of leaded gasoline may be ingested directly or contribute to indoor levels of lead-contaminated dust when tracked into the home. Children may also be exposed to lead through the ingestion of lead-based paint chips from flaking walls, windows, and doors or from chewing on surfaces covered with lead-based paint. Other sources of lead exposure include, but are not limited to, lead-contaminated food and drinking water and occupational exposure to dust and airborne lead particles.

Considerable progress has been made in reducing environmental lead levels. Concrete steps taken by the Federal government to eliminate sources of lead include the phase-out of leaded gasoline by EPA (40 CFR part 80) and the ban by the Consumer Product Safety Commission (CPSC) of the production and sale of lead-based paint for residential use in 1978 (16 CFR part 1303). The CPSC action placed a maximum limit on the amount of lead in paint (0.06 percent by weight) for residential use, as well as for furniture and toys. In addition, EPA has implemented more stringent standards for lead in drinking water, and the domestic canning industry voluntarily eliminated the use of lead in solder to seal food cans (40 CFR parts 141 and 142).

Consistent with these improvements, the percentage of children with elevated blood-lead levels has declined over the last 20 years. The National Health and Nutrition Examination Survey (NHANES) conducted by the National Center for Health Statistics indicates that over the past 2 decades the average child's blood-lead level has decreased from 12.8 micrograms/deciliters (µg/dl) to 2.8 µg/dl (Ref. 5). According to NHANES III Phase 2, completed in 1994, approximately 900,000 U.S. children of ages 1 to 5 years had blood-lead levels equal to or exceeding the 10 µg/dl (Ref. 6).

Excessive exposure to lead affects children across all socio-economic strata and in all regions of the country. Children in poor inner-city families, however, are disproportionately affected because lead-based paint hazards are more prevalent in older housing and the overall ambient level of environmental lead from all sources tends to be higher in inner cities (Ref. 7). Studies indicate that children living in central cities are three to four times more likely to have blood-lead levels equal to or exceeding 10 µg/dl than those outside central cities, with the highest prevalence in cities where populations exceed 1 million (Ref. 7).

According to EPA's report on the HUD National Survey of Lead-Based Paint in Housing, 83 percent of privately-owned, occupied homes built before 1980, or 64.4 million homes, contain some lead-based paint (Ref. 8). The likelihood, extent, and concentration of lead-based paint vary with the age of the building. Eighty-eight percent of privately-owned, occupied housing units constructed before 1940, 92 percent of units constructed between 1940 and 1959, and 76 percent of units constructed between 1960 and 1979 contain some lead-based paint (Ref. 8). Over 12 million (or 19 percent) of these pre-1980 homes with some lead-based paint have children aged 7 years or younger in residence (Ref. 8). (The HUD National Survey presents results for children aged 7 years or younger; Title X, which was enacted after the survey was conducted, focuses upon children younger than 6 years.)

All homes containing lead-based paint pose a potential future hazard to the occupants if the paint is not managed properly. Intact lead-based paint may deteriorate over time to create a hazardous condition. According to EPA's analysis of the HUD National Survey, about 19 percent of pre-1980 privately-owned units contained non-intact lead-based paint in 1989-90, which was defined at the time of the survey as greater than 5 square feet of peeling, chipping, or otherwise deteriorated paint (Ref. 8). Assuming that the percent of pre-1980 homes with non-intact lead-based paint that have young children is the same as the percent of pre-1980 homes with some lead-based paint that have young children (19 percent), about four percent of pre-1980 homes in the United States contained both non-intact lead-based paint and young children.

Based on the HUD National Survey, EPA estimates that 13 million or 17 percent of pre-1980 privately-owned homes have ''elevated'' lead dust levels, which were defined at the time of the Survey as lead dust exceeding 200 µg/ft^2 on floors, 500 µg/ft^2 on window sills, or 800 µg/ft^2 on window troughs (Ref. 8). Homes with non-intact lead-based paint were five times more likely to have elevated lead dust levels than homes with intact lead-based paint (Ref. 9).

EPA's analysis of the HUD National Survey also estimates that approximately 16 million or 21 percent of privately-owned pre-1980 housing units have soil-lead concentrations exceeding 400 ppm (Ref. 8). The prevalence of soil-lead levels exceeding 400 ppm varies greatly with the age of housing. Sixty percent of pre-1940 units, but only eight percent of 1940-1959 units and four percent of 1960-

1979 units have such soil-lead concentrations (Ref. 9).

B. Structure of Basic Legal Authorities

The Housing and Community Development Act of 1992 (Pub. L. 102-550), enacted on October 29, 1992, contains 16 titles amending and extending a number of laws relating to housing and community development. Title X of this Act, entitled the ''Residential Lead-Based Paint Hazard Reduction Act of 1992,'' contains five subtitles extending and establishing programs for reducing exposure to lead, principally, in paint and residential dust and soil. Provisions of Title X are codified in the United States Code (U.S.C.) at volume 42, section 4851 and at various other sections of volume 42, as well as of volumes 12 and 15.

Subtitle A of Title X (codified at volume 42 U.S.C. 4852, and at various other sections of volumes 42 and 12) applies primarily to grants and other programs under the jurisdiction of the Secretary of Housing and Urban Development (HUD). Subtitle B of Title X amends the Toxic Substances Control Act (TSCA), 15 U.S.C. 2601, *et. seq.*, by adding Title IV, which requires EPA to establish requirements for training and accreditation of contractors performing lead-based paint related work, issue the standards being proposed today, sponsor public education programs, establish programs for studying the effectiveness of lead-based paint hazard evaluation and control products, and establish a laboratory accreditation program. Subtitle C of Title X deals with worker protection and training under jurisdiction of the Occupational Safety and Health Administration (OSHA) and the National Institute of Occupational Safety and Health (NIOSH). Subtitles D and E provide for research and reporting on various aspects of lead-based paint activities. These last three subtitles are codified at volume 42 U.S.C. 4853 to 4856.

An overview of the particular regulatory sections in the Subparts of Title X that relate to this proposed rule follows.

1. *EPA responsibilities*. Under TSCA section 402 (15 U.S.C. 2682), EPA has promulgated regulations governing the training and certification of individuals and firms engaged in lead-based paint activities, the accreditation of programs to train such individuals, and work practice standards for conducting lead-based paint activities. These regulations were published in the **Federal Register** of August 29, 1996 (61 FR 45778) (FRL–5389–9), and are codified at 40 CFR part 745, subpart L. EPA will amend these regulations at a later date to address deleading in public and commercial buildings, and other structures, such as bridges.

In conjunction with these activities, EPA developed specific guidelines under section 402(c)(1) for renovation and remodeling activities that may create a risk of exposure to dangerous levels of lead (Ref. 10). Under TSCA section 402(c)(3), EPA is required to revise the certification and accreditation regulations under 40 CFR part 745, subpart L, to address renovation and remodeling activities that create lead-based paint hazards, after conducting a study of such activities.

In conjunction with the TSCA section 402 rule, EPA, under TSCA section 404 (15 U.S.C. 2684), developed a Model State Program, which States and Indian Tribes are encouraged to reference and use as guidance to develop their own Federally-authorized lead-based paint activities programs. The regulations in 40 CFR part 745, subpart Q, include procedures for States and Indian Tribes to follow when applying to EPA for authorization to administer and enforce a State or Tribal training, accreditation, and certification program.

Under TSCA section 406(a) (15 U.S.C. 2686(a)), EPA, HUD, and CPSC jointly released a lead hazard information pamphlet, *Protect Your Family from Lead in Your Home* (60 FR 39167, August 1, 1995) (FRL–4966–6). The pamphlet is designed to educate families about the potential health risks associated with lead exposure and ways to avoid such exposure.

Under TSCA section 406(b), EPA has promulgated a regulation to require persons performing renovation work for compensation in residential housing built before 1978 to provide owners and occupants with a lead hazard information pamphlet before renovation begins.

Under Title X, section 1018 (42 U.S.C. 4852(d)), EPA and HUD have jointly developed regulations requiring a seller or lessor of most pre-1978 housing to disclose the presence of any known lead-based paint or lead-based paint hazards to the purchaser or lessee (24 CFR part 35, subpart H; 40 CFR part 745, subpart F). Under these rules, the seller or lessor also must provide the purchaser or lessee any available records or reports pertaining to such paint or hazards and a copy of the lead hazard information pamphlet. Additionally, the seller must allow the purchaser 10 days to conduct an inspection or risk assessment for the presence of lead-based paint or lead-based paint hazards. Finally, the sale or leasing contract must include certain disclosure and acknowledgment provisions, and real estate agents must ensure compliance with these standards.

2. *HUD responsibilities*. In addition, to the joint regulations issued with EPA under section 1018 of Title X, HUD has a number of programs under its own authorities that will be affected by the rule.

Under section 1011 of Title X (42 U.S.C. 4852), HUD provides grants to State and local governments to evaluate and reduce lead-based paint hazards in pre-1978 housing that qualifies as affordable housing and is not Federally-assisted, Federally-owned, or public housing.

Under Title X sections 1012 and 1013, HUD is required to establish lead-based paint hazard notification, evaluation, and reduction requirements for HUD-associated housing and Federally-owned housing under provisions codified at various parts of 42 U.S.C. These regulations, which HUD proposed on June 7, 1996 (61 FR 29170), will establish programmatic lead-based paint hazard notification, evaluation, and reduction requirements and will describe how these activities should be performed. The latter set of standards are based on the detailed *HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* (hereinafter HUD Guidelines) (Ref. 11), which HUD developed under Title X section 1017 (42 U.S.C. 4852c), and on EPA's TSCA section 402 standards described above. The HUD Guidelines reflect input from housing, public health, and environmental professionals with broad experience in lead-based paint hazard identification and control.

3. *Other agencies*. The Department of Health and Human Services (HHS), CPSC, the Department of Labor, and other Federal agencies have contributed to the development of standards and other programs under Title X, including through their consultation with EPA and HUD. EPA, HUD, and CPSC jointly released the lead hazard information pamphlet in consultation with CDC. Under section 1031 of Title X (subpart C), OSHA promulgated interim final employee protection requirements for construction workers exposed to lead, which apply to lead-based paint activities in residential housing and other construction settings (29 CFR 1926.62).

C. Regulatory Development Process

EPA began development of the proposed rule immediately following enactment of Title X. The Agency quickly encountered significant challenges in its design and implementation of the risk and economic analyses needed to guide selection of the standards. Recognizing the growing need for advice on this issue, EPA released an interim guidance document in July 1994 to provide public and private decision-makers with guidance on identifying and prioritizing lead-based paint hazards for control. The recommendations in the guidance represented the Agency's best judgment given the state of knowledge at the time. EPA subsequently published the interim guidance document in the **Federal Register** of September 11, 1995 (60 FR 47248) (FRL–4969–6). The interim guidance will continue to serve as EPA's official policy until EPA promulgates final standards under TSCA section 403.

The TSCA section 403 regulations are a significant component of the national lead-based paint hazard reduction program. As such, these regulations will likely have a broad impact on public health and housing. In light of these potential impacts as well as intense interest in this proposed rule expressed by a large number of stakeholders, EPA established a Dialogue Process to provide a forum where EPA could obtain input early in the rulemaking process from representatives of a range of groups that have an interest in the TSCA section 403 regulations. Interested parties included lead-poisoning prevention experts, environmental advocates, housing providers, the lead industry, State and local governments, the banking and insurance industries, and the lead risk assessment and abatement industry. EPA did not use the Dialogue Process to develop a consensus among the participants, but rather used the Process to gather individual points of view. Meetings were open to the public and a summary of each meeting was placed in the public record for this proposed rule (Refs. 12-16).

EPA held five meetings using the Dialogue Process: October 19, 1995; December 14, 1995; February 15, 1996; March 21, 1996; and November 12, 1997. The first four meetings focused on a range of policy and implementation issues for which EPA presented a range of potential options. Participants commented on these options and sometimes suggested options EPA had not previously considered. Dialogue Process participants also identified issues EPA had not presented to the group. The Dialogue Process did not address questions related to the risk analysis or the technical basis for the rule. These are important and difficult issues but were beyond the scope of the policy level input EPA was seeking from the Dialogue. The Agency, instead, presented its risk analysis document for an expedited peer review in August 1997. Comments provided by the reviewers can be found in the public record for this proposed rule. EPA will also ask its Science Advisory Board (SAB) to review the risk analysis during the public comment period for today's proposed rule. The SAB report will also be placed in the public record, and EPA will consider this report in its development of the final rule.

At the final meeting, EPA staff presented a draft of the options for the proposed rule being recommended to senior Agency managers. This meeting provided an opportunity for interested parties to express their concerns about the current direction of the proposed rule and allowed EPA to address these concerns by clarifying the Agency's rationale or by seeking additional input. By addressing the concerns of interested parties in the proposal, EPA hopes to facilitate the process of finalizing the proposed regulations.

In addition to the Dialogue Process, EPA staff met with the public in a variety of other forums to discuss issues related to the rule. These forums included conferences sponsored by trade associations, seminars sponsored by real estate groups (e.g., Owners and Managers Group of the Mid-Atlantic Region, Real Estate Board of New York) and legal publications (e.g., New York Law Journal), and meetings with interested parties. In most of these settings, EPA staff provided an update on the status of the rulemaking and responded to questions. Occasionally, EPA met with interested parties to obtain information on specific issues of concern. For example, Agency staff met with representatives of rental property owners to gauge owner response to the regulatory standards. In several instances, interested parties requested meetings with EPA to provide their perspective on specific regulatory and/or technical issues. EPA has placed a summary of all meetings between its staff and interested parties in the public record for this proposed rule (Ref. 17). EPA did not prepare summaries of presentations delivered at conferences and seminars.

D. General Approach to Standard Setting

Before EPA could formulate and analyze options for the TSCA section 403 standards, the Agency had to develop an overall approach for the rulemaking. EPA's standard-setting approach was based on the outcome of two decisions. The first decision was whether the Agency should develop uniform national standards or standards that are targeted (e.g., to specific communities or populations). The second decision was whether EPA should develop independent, media-specific standards or joint standards. This unit presents EPA's analysis of these issues and its decisions.

1. *Uniform, national standards, or targeted standards.* The establishment of the standards in today's proposal required estimates of the relationship between environmental lead levels (from paint, dust, and soil) and their effects on the health of exposed children. This relationship is extremely complex, and is dependent upon numerous site-specific and child-specific factors. These estimates are more accurate on a smaller (residence or community) scale, where more site-specific factors can be considered.

A targeted approach to standard-setting (i.e., community- or resident-specific standards) would result in numerically different standards for each residence or community. Developing national standards, on the other hand, would produce the same numerical standard for all residences and communities, but with an attendant loss of accuracy. That is, national standards would be more protective at some locations and less protective at others because national standards would not account for community- or residence-specific factors.

EPA decided, based on considerations of feasibility and ease of implementation, that national standards are the most appropriate regulatory approach. First, the data needed to establish standards at a smaller scale are neither collected under the Title X program nor available for communities nationwide. Much of the necessary residence-specific data could be collected to establish residence-specific standards, but lead-based paint risk assessments would have to be broader in scope (i.e., include water sampling and sampling of other ambient environmental levels) and more costly than currently envisioned. Even then, residence-specific standards would not account for variability in exposure influenced by child-specific factors (e.g., hand-to-mouth behavior, hygiene, nutrition). Community-specific data would require new resource-intensive data collection efforts (e.g, patterns of soil contamination, water lead levels). In contrast, national data on lead in paint, dust, and soil are currently available.

Second, uniform national standards are easier to implement. National standards provide a fixed basis of comparison for all homes. National standards can also be used to compare properties and establish priorities. In contrast, with residence-specific standards, there would be millions of standards. Such a regulation would be largely unworkable. Property owners and other decision-makers would not know what standard would apply until a hazard evaluation was conducted. Rental property owners who own multiple properties would be working with a different standard for each property. In addition, residence-specific standards would not help establish priorities because it would be extremely difficult to compare the relative needs of different properties.

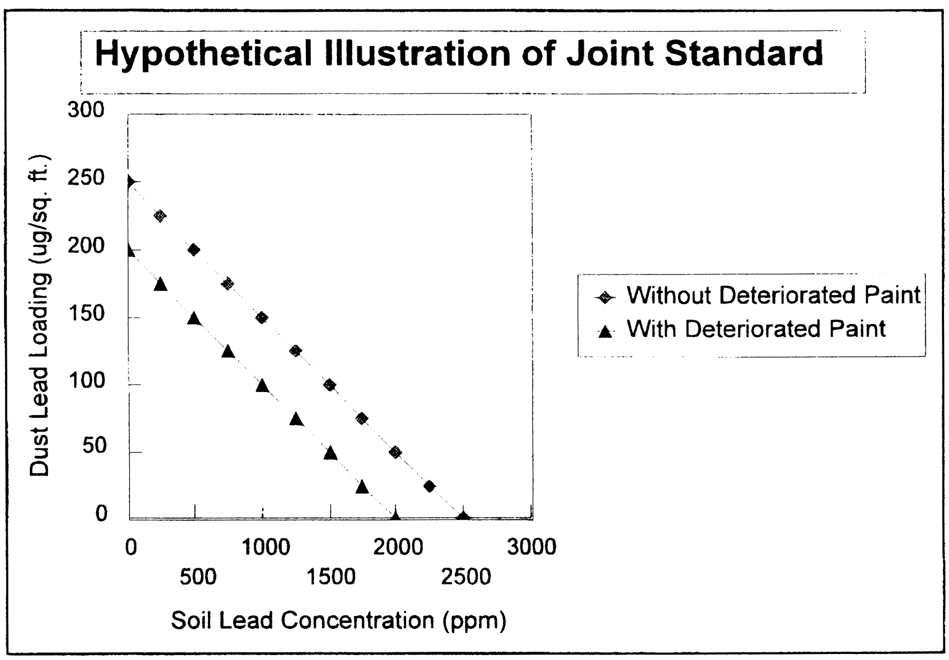
In making this decision, the Agency was also mindful that certain segments of the population have a higher incidence of elevated blood-lead levels (e.g., some minority children in inner-city neighborhoods) and a case could be made for proposing more stringent standards for particular neighborhoods. However, estimates of the relationship between environmental lead levels and children's health effects are not sufficiently refined to distinguish relationships for particular subsets of the general population of children.

In light of the recently released NHANES III, Phase 2 data, EPA considered an alternative option under which uniform standards would only be effective in higher risk communities. EPA, however, rejected this option because there is insufficient data to definitively identify these higher risk communities. In addition, the development of standards for higher risk communities would introduce significant complexities. First, EPA would have to establish criteria for identifying these communities. Second, the Agency would have to develop a set of standards for each category of community. Third, EPA would have to develop an approach for addressing neighborhoods that border on higher risk communities. As an alternative, the Agency believes that an effective and simpler approach to address vulnerable communities is through program implementation (e.g., training, education, and environmental justice grants).

EPA also wishes to note that Congress envisioned that important elements of the Title X program would be delegated to the States. Accordingly, the Agency preferred to establish a simple, minimal set of standards that could easily be adopted by States and allow them to tailor the standards (i.e., by considering more site-specific factors), should they so choose. Consequently, States will have greater flexibility in establishing and implementing their programs while a national, baseline level of protection to children is maintained.

Because the decision to set uniform national standards has a significant impact on the standard-setting process, EPA is interested in obtaining comment on this issue. The Agency would like specific input on how EPA should set standards that will ensure national resources are targeted commensurate with risk.

2. *Joint, media-specific standards vs. joint standards.* The second issue that shaped EPA's standard-setting approach involves the fact that a child's total lead exposure is the sum of contributions from numerous sources, including paint, dust, soil, and others. Specifically, EPA had to decide whether to set separate, independent standards for paint, dust, and soil or to integrate the standards. Under the first option, EPA would establish the standard for each medium without considering the conditions in the other media. For example, the standard for soil would not be affected by the level of lead in dust. The soil standard would remain constant, regardless of whether dust lead levels were high or low. The chief advantage of this option is that the standards are simple to understand and use. The main disadvantage is that the standard for each medium may not correspond to total exposure and risk.



Under the second option, EPA would set standards to account for total lead exposure from all media. Under a joint standard, the standard for each medium would vary, depending on the conditions in the other media. For example, the Agency could graphically represent combinations of hazardous levels of lead in dust and soil with a downward sloping line. In this graph, shown in Figure 1, the horizontal axis could depict the level of lead in soil.

The vertical axis could depict the level of lead in dust. Any point on this chart, therefore, would illustrate a combination of lead dust and lead soil levels. The downward sloping line would intersect the horizontal axis at the point representing the highest acceptable level of lead in soil if there is no lead in dust. The line would intersect the vertical axis at the point representing the highest acceptable level of lead in dust if there were no lead in soil. All points above the line would be defined as hazardous. To incorporate the condition of paint into the joint dust and soil standards, the Agency, in theory, could establish two downward sloping lines: one for homes with no deteriorated lead-based paint and another for homes with deteriorated lead-based paint. The major advantage of the joint standards is that they better reflect the total exposure and risk. On the other hand, joint standards are more difficult to explain, understand, and use.

Normally, EPA would tend to favor the approach that better reflects risk to human health. Certainly the joint standard approach described above would be the approach of choice in evaluating the environmental risks to a child in a specific house. In the context of this proposed rule, however, EPA has concluded that single, medium-specific standards would be far more workable than joint standards for many of the same reasons that national standards are more workable than targeted standards. First, media-specific standards provide a fixed basis of comparison for all homes and can be used to compare properties and establish priorities. Second, EPA believes that fixed numerical standards are more easily understood than standards that require an understanding of mathematical relationships. In addition, the Agency does not currently possess the analytical techniques necessary to relate dust loadings to soil concentrations, the measurement basis for the dust and soil standards. Consequently, EPA lacks a technical method to establish joint standards.

III. Section-by-Section Review of the Proposed Rule

This unit of the preamble provides a section-by-section explanation of the proposed regulations. The proposed regulations consist of five components: the proposed section 403 standards for lead-based paint hazards; amendments to the final section 402 regulations; amendments to the final section 404 regulations; and definitions for specific terms. The unit focuses on the proposed section 403 standards, the proposed amendments to the final section 402 regulations, and the amendments to the final section 404 regulation. The definitions are discussed in relation to the relevant proposed regulatory provisions. Furthermore, the definitions in proposed § 745.63 that already exist in 40 CFR 745.223 are not subject to public comment.

A. Proposed Section 403 Standards

The TSCA section 403 standards consist of three parts: scope and applicability; the standards for lead-based paint hazards; and provisions for implementing the standards.

1. *Scope and applicability*. The scope and applicability part of the standards, which is stated in proposed § 745.61, would establish that the proposed standards would apply to target housing (i.e., most pre-1978 housing) and child-occupied facilities.

This part of the proposed rule also makes it clear that the TSCA section 403 standards do not require the owner of properties covered by this proposed rule to evaluate his/her properties for the presence of lead-based paint hazards, or to take any action to control these conditions if one or more of them is identified.

2. *Standards for lead-based paint hazards.* The proposed standards for lead-based paint hazards are codified in proposed § 745.65. Proposed § 745.65(a) states that hazardous lead-based paint includes lead-based paint in poor condition. Proposed § 745.63 defines paint in poor condition as more than 10 square feet of deteriorated paint on exterior components with large surface areas, more than 2 square feet of deteriorated paint on interior components with large surface areas (e.g., walls, ceilings, floors), or deteriorated paint on more than 10 percent of the total surface area of interior or exterior components with small surface areas (e.g., trim, baseboards). EPA is not proposing hazardous lead-based paint standards for accessible surfaces and friction and impact surfaces. The Agency, instead, has presented a range of options for these standards, which are discussed in Unit IV.D.2 and IV.D.3. of this preamble. EPA is seeking public comment on these options and will promulgate standards as part of the final rule based on these options and consideration of public input.

Proposed § 745.65(b) identifies dust-lead hazards in terms of lead loading and location. Lead loading is the quantity of lead present per unit of surface area (e.g., micrograms per square foot). The proposed dust-lead hazard standard is 50 $\mu g/ft^2$ for uncarpeted floors and 250 $\mu g/ft^2$ for interior window sills. The proposed rule does not include a dust-lead hazard standard for carpeted floors or for window troughs.

Proposed § 745.65(c) identifies soil-lead hazards in terms of lead concentration. Lead concentration is the relative content of lead within the soil measured in parts per million by weight. The proposed standard for soil-lead hazard is 2,000 ppm.

3. *Proposed requirements for implementing the standards*. This part of the proposal describes the requirements for how a certified risk assessor would compare on-site observations and sampling results to the standards to determine whether lead-based paint hazards are present. The general requirements are in § 745.69. EPA has incorporated the specific requirements, which are summarized in Table 1 below, into the work practice standards for lead-based paint activities found at 40 CFR 745.227.

Proposed § 745.69 would establish that the determination requirements are applicable to the standards for lead-based paint hazards. It also states that the determination would have to be made by a certified risk assessor performing a risk assessment according to the risk assessment work practice standards. Third, the proposed regulations state that, for purposes of determining the presence of a dust-lead hazard, the risk assessor must compare the weighted arithmetic means of the samples to the applicable standard. For purposes of determining the presence of soil-lead hazards, the risk assessor must compare the arithmetic means of the samples to the applicable standard.

Table 1.—Summary of Regulations for Determining the Presence of Lead-Based Paint Hazards

Type and Location of Hazard/Contamination	Method
Hazardous lead-based paint: lead-based paint in poor condition	Visual assessment for condition of paint; test paint; assume all like surfaces that have similar painting history contain lead-based paint if tested component has lead-based paint

Table 1.—Summary of Regulations for Determining the Presence of Lead-Based Paint Hazards—Continued

Type and Location of Hazard/Contamination	Method
Dust-lead hazard: uncarpeted floors (single-family and sampled units and common areas in multi-family)	Compare weighted arithmetic mean lead loading of all samples for uncarpeted floors to the hazard standard for floors
Dust-lead hazard: interior window sills (single-family and sampled units and common areas in multi-family)	Compare weighted arithmetic mean lead loading of all samples for interior window sills to the hazard standard for sills
Dust-lead hazard: uncarpeted floors (unsampled units and common areas in multi-family)	Assumed to be hazard if hazard is present in any sampled unit or common area of the same type
Dust-lead hazard: interior window sills (unsampled units and common areas in multi-family)	Assumed to be hazard if hazard is present in any sampled unit or common area of the same type
Soil-lead hazard	Compare arithmetic mean of dripline and mid-yard samples to hazard standard

Proposed § 745.227(h) would establish the specific requirements for how to determine whether lead-based paint hazards are present. To determine whether hazardous lead-based paint is present, the risk assessor must test paint that is in poor condition. The paint on all surfaces with paint in poor condition need not be tested. The risk assessor, however, must assume that untested surfaces contain lead-based paint if tested surfaces that have a similar painting history contain lead-based paint.

To determine whether a dust-lead hazard is present, the risk assessor must compare the weighted mean (i.e., weighted average) of all single surface samples or all composite samples to the appropriate dust-lead hazard standard (i.e., uncarpeted floors, interior window sills).

In multi-family housing, where risk assessors have the option not to collect dust samples in every residential unit or common area, the approach described in the previous paragraph applies to all sampled residential units and common areas where samples were collected. For residential units or common areas where samples are not collected, the risk assessor would have to make assumptions based on the results of sampled residential units and common areas. If at least one sampled residential unit or common area exceeds the hazard standard for a specific surface (i.e, floors, sills), then the risk assessor would have to assume that hazards exist on that surface in all unsampled residential units and common areas. It should be noted that risk assessors always have the option to collect samples from all units and common areas at a multi-family property.

Proposed § 745.227(h) also would establish the requirements for how to determine whether a soil-lead hazard is present. Under the proposal, the risk assessor must compare the mean of a composite sample from the dripline and a composite sample from the mid-yard for each residential building to the standards to determine whether a hazard is present. If the risk assessor collects more than one composite in either the dripline or the mid-yard for a building, he or she should compute the average of the composites from each area and use those averages to compute the average concentration for the dripline and the mid-yard.

Proposed § 745.63 defines the dripline and mid-yard. The dripline is the area within 3 feet surrounding the perimeter of a building. The mid-yard is the part of yard that lies halfway between the outermost edge of the dripline and property line or between the outermost edge of the dripline and the outermost edge of the dripline of another residential building on the same property. This approach applies to both properties with a single residential building and to those with more than one residential building.

B. Proposed Amendments to the Final Section 402 Regulations

Today's action includes proposed amendments to the final TSCA section 402 work practice regulations for lead-based paint activities at 40 CFR 745.227. The proposed amendments would establish clearance standards for dust, limit reuse of abated soil, add a requirement for interpreting composite dust clearance samples, and change risk assessment and clearance sampling requirements to ensure compatibility between sampling results and the TSCA section 403 standards and section 402 clearance standards. Unit IX. of this preamble discusses these amendments and the Agency's rationale and supporting analyses for its decisions.

Today's action proposes to amend the abatement work practice standards at 40 CFR 745.227(e) by adding clearance standards for dust. A risk assessor performs clearance testing to evaluate the adequacy of post-abatement dust cleaning. The proposed clearance standards are 50 μg/ft² for uncarpeted floors, 250 μg/ft² for interior window sills, and 800 μg/ft² for window troughs.

Second, today's action includes a proposed amendment to the abatement work practice standards at 40 CFR 745.227(e) to prohibit the reuse of soil removed during an abatement as top soil in another residential yard or child-occupied facility. The current regulations do not provide any management controls for the soil.

Third, today's proposal includes an amendment to the abatement work practice standards at 40 CFR 745.227(e) to add a requirement for interpreting composite dust samples for clearance. The current regulation does not differentiate between single surface samples and composite samples. The proposed amendment would require the risk assessor to compare the composite sample to the clearance standard divided by the number of subsamples in the composite. For example, if the composite contains four subsamples, the risk assessor would compare the composite to the clearance standard divided by four.

Fourth, the Agency is proposing that the risk assessment work practice standards at 40 CFR 745.227 be amended to require that risk assessor collect dust samples from uncarpeted floors and interior window sills because EPA is proposing dust-lead hazard standards for uncarpeted floors and window sills. Today's proposal also includes an amendment to the abatement work practice standards at 40 CFR 745.227(e) to require that a risk assessor collect dust clearance samples from uncarpeted floors, window sills, and window troughs because EPA is proposing clearance standards for all three surfaces. The current risk assessment and abatement work practice standards require risk assessors to collect dust samples from windows without specifying the part of the window. The Agency is also proposing to amend the risk assessment work practice standards to change the location of soil samples from the dripline and ''play area'' to the dripline and mid-yard.

C. Proposed Amendments to the Final Section 404 Regulations

Today's action includes proposed amendments to the final TSCA section 404 States/Tribal program authorization regulations found at 40 CFR part 745, subpart Q. These proposed amendments would require States/Tribes that are seeking program authorization and States/Tribes that already have applied for authorization and wish to retain it to incorporate lead-based paint hazard standards that are as protective as the Federal standards no later than their first report to EPA after years following the promulgation of the TSCA section 403 standards.

States/Tribes seeking authorization for the first time would include their standards in their program application, the requirements for which are described in 40 CFR 745.320 to 40 CFR 745.325. Proposed amendments to § 745.325, would explicitly clarify that lead-based paint hazard standards and implementation requirements are necessary components of the risk assessment work practice standards in § 745.325(d)(2). States/Tribes seeking to retain program authorization would describe their standards in their regular report to EPA in accordance with 40 CFR 745.324(h).

IV. Development of this Proposed Rule

This unit of the preamble presents EPA's analysis of its legal authority, and describes the Agency's policy basis, technical analyses, and decisions for the proposed section 403 standards. Section A discusses EPA's legal authority and policy basis for the standards. Section B discusses the technical analysis to support the development of the proposed standards for dust and soil. Section C presents EPA's analysis of the options for dust and soil standards and explains the Agency's decisions. Section D presents the analysis of the options for the paint hazard standard and explains the Agency's decisions. The standard for lead-based paint, as further explained below, is defined by statute and EPA is not modifying that standard in this proposed rule.

A. Authority for Today's Action

1. *Statutory mandate and related definitions.* Section 403 of TSCA is the key statutory provision for today's proposed regulation. It requires EPA to identify three terms—lead-based paint hazards, lead-contaminated dust, and lead-contaminated soil. For reasons explained below, EPA needs to first define lead-contaminated dust and soil before it may define lead-based paint hazards. These three terms and other definitions that help define them are found in both TSCA section 401 (15 U.S.C. 2681) and in section 1004 of Title X (42 U.S.C. 4851b). Because the definitions in both of these sections are identical for practical purposes, the remainder of this preamble will cite the TSCA definitions. Below, EPA explains how the definitions affect the Agency's responsibilities in this proposed rule.

TSCA section 401(10) defines ''lead-based paint hazard'' to mean any condition that causes exposure to lead from lead-contaminated dust, lead-contaminated soil, lead-contaminated paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that *would result* in adverse human health effects . . . [emphasis added].

Thus, there are three sources that may contribute to the existence of a lead-based paint hazard—lead-contaminated paint, lead-contaminated dust, and lead-contaminated soil.

EPA interprets lead-contaminated paint to mean the same as ''lead-based paint,'' which is defined by TSCA section 401(9) to mean paint or other surface coatings that contain lead in concentrations equaling or exceeding limits established under section 302(c) of the Lead Based Paint Poisoning Prevention Act (42 U.S.C. 4822(c)). Currently, this limit is lead content that equals or exceeds 1.0 milligrams per square centimeter (mg/cm^2) or 0.5 percent by weight. EPA is not taking any action in this proposed rule to redefine lead-based paint.

It must be emphasized that lead-based paint is not a risk-based term. It is only a benchmark that identifies material subject to the jurisdiction of various authorities of TSCA and Title X. Instead, the term ''lead-based paint hazard'' will identify those conditions of lead-based paint that would result in adverse health effects. The statutory language makes it clear that not all lead-based paint is to be considered a lead-based paint hazard. In fact, for lead paint to be a hazard it must, at least, be deteriorated or be present on friction or impact surfaces or on surfaces accessible for young children to mouth or chew. Deteriorated paint is defined in TSCA 401(3). Friction, impact, and accessible surfaces are defined in TSCA 401(2), (5) and (6).

Lead-based paint hazards, furthermore, are not limited to the hazards from paint, alone, because they include conditions that cause exposure to residential lead-contaminated dust and soil, regardless of the source of lead. EPA is responsible in this proposed rule for identifying what constitutes lead-contaminated dust and soil. Both terms are limited to dust and soil in residences, in contrast to lead paint, which may be found in public and commercial buildings and in other structures, such as bridges or superstructures (e.g., water towers).

Lead-contaminated dust means surface dust in residential dwellings that contains lead determined by EPA to *pose a threat* of adverse health effects in pregnant women or young children [emphasis added] (TSCA 401(11)). Lead-contaminated soil means *bare* soil on residential property that contains lead that is *determined to be hazardous* to human health by EPA (TSCA 401(12)) [emphasis added].

The lead-based paint hazard definition contains the overarching legal standard applicable to today's proposed regulation. In pertinent part, the definition means any condition that causes exposure to lead-contaminated dust, soil, or paint that would result in adverse human health effects. To determine what constitutes lead-contaminated dust or soil, on the other hand, EPA interprets the statute to require a less rigorous level of certainty regarding the likelihood of adverse effects occurring to establish the standards.

2. *Statutory criteria for lead-contaminated dust and soil, and lead-based paint hazards.* Given the definitions of lead-based paint hazards, lead-contaminated dust, and lead-contaminated soil in TSCA section 401, EPA needs to establish standards for lead-contaminated dust and soil separately from lead-based paint hazards. Put simply, not all lead-contaminated dust or lead-contaminated soil (or lead-based paint) needs to be considered hazardous. In fact, as explained below, the definitions in TSCA section 401 support the Agency's adoption of a weight of evidence approach for setting the varying standards.

To help differentiate between lead-contaminated dust and soil and lead-contaminated dust and soil that are lead-based paint hazards, and to alleviate the confusion created by this terminology, the Agency will generally refer to lead-contaminated dust and soil that meet the lead-based paint hazard criteria as dust-lead hazards and soil-lead hazards. EPA will refer to the paint component of lead-based paint hazards as hazardous lead-based paint.

a. *Contamination standards.* As indicated above, EPA believes that the term ''poses a threat,'' used to define lead-contaminated dust, connotes a lower level of certainty regarding risk than the term ''would result in adverse effects,'' used to define lead-based paint hazard, and indicates that the standard for lead-contaminated dust requires a lesser weight of evidence of harm. The level of certainty associated with the term ''hazardous to human health,'' which is used to define lead-contaminated soil, is less clear. The overall structure of the definitions in section 401, however, indicates parallel treatment for lead-contaminated dust and soil. EPA is, therefore, interpreting ''poses a threat'' and ''hazardous to human health'' to be associated with the same level of evidence needed to determine risk.

The terms ''lead-contaminated'' dust and soil, therefore, describe the universe of lead in soil and dust about which there may be some level of concern. Within this universe are levels of lead-contaminated dust and soil that result in lead-based paint hazards, which engender greater concern because there is greater certainty of risk of adverse human health effects. Identifying hazardous paint, dust, and soil, therefore, requires a greater weight of evidence of harm.

The terms lead-contaminated dust and lead-contaminated soil, while necessary components of the definition of lead-based paint hazards, do not appear anywhere else in Title X. Thus, they have no direct effect on any activities subject to regulation under Title X. For example, no certification requirements are imposed for persons who remove lead-contaminated soil, only soil associated with soil-lead hazards. EPA concludes from this observation that the purpose for identifying lead-contaminated dust and soil separately from hazardous dust and soil is to identify levels of dust and soil contamination for which there are lower levels of certainty regarding adverse effects and general population concern, but about which owners and occupants of residential property should be aware. Individual owners and occupants may wish to make decisions based on the lesser level of certainty. To convey this message, EPA has decided to call the standards for lead-contaminated dust and soil, dust-lead and soil-lead ''levels of concern.'' EPA has decided that the levels of concern should be based solely on their potential to pose a threat to human health, without regard to whether taking action on these levels could result in significant risk reduction, or whether the resources that persons may choose to expend on dealing with dust and soil at these levels are commensurate with any potential risk reduction.

Because the level of concern does not affect other activities under Title X or TSCA Title IV, EPA has decided not to include the levels of concern in the proposed regulation. Nevertheless, because the level of concern communicates important risk information to property owners and occupants, the Agency believes that it is important to include the levels of concern in the preamble and guidance that will accompany the rule. At this point, the Agency is only proposing to adopt in guidance a separate level of concern for lead in soil, which is discussed in detail in Unit IV of this preamble. The Agency has decided that there should not be a separate dust-lead level of concern, even in guidance, because EPA's analysis shows that dust-lead level of concern should be the same as the dust-lead hazard standard. The Agency believes, therefore, that having a separate dust-lead level of concern would not provide useful additional information to the public.

EPA is interested in public input with respect to the inclusion of the levels of concern, particularly for soil, in the regulatory text of the document. Specifically, EPA is seeking comment on whether the absence of the soil-lead level of concern in the regulation would diminish the visibility of the level and reduce its usefulness as a risk communication tool, or whether the soil-lead level of concern would be treated as the *de facto* hazard standard if it were included in the regulation. EPA does not believe that the public should confuse the soil-lead level of concern in the guidance, with the soil-lead hazard standard in the regulation. As indicated above, the Agency is specifically interested in comments on this issue.

b. *Hazard standards.* The determination of what constitutes lead-based paint hazards--hazardous paint, dust, and soil--will require a more elaborate analysis. Clearly, the statutory criterion for hazard, ''would result in adverse human health effects,'' means that lead-based paint hazards are associated with a higher level of risk than levels of concern. The challenge to the Agency is how to identify the higher level of risk.

Based on the language of section 403, the purposes of Title X and its legislative history, and basic policy discussions explained below, EPA determined that it should identify this higher level of risk based on consideration of the potential for risk reduction of any action taken (considering uncertainties in the scientific evidence describing the risks) and whether such risk reductions are commensurate with the costs of those actions. This is commonly referred to as cost-benefit balancing.

The use of the term ''would result'' in the statutory criteria --''would result in adverse human health effects''--implies certainty of adverse outcome. This interpretation is supported the by legislative history discussed in the Senate Committee Report (*National Affordable Housing Act Amendments of 1992*, Report of the Committee on Banking, Housing and Urban Affairs, S. Rep. 102-332, 102d Cong., 2nd Sess., at 112 (hereinafter ''Senate Report'')). The Senate Report states that Title X ''limits the definition of hazard, and thus the scope of the bill to *actual* hazards--conditions that cause [ ] exposure to lead . . . that would result in adverse human effects'' [emphasis added] (Senate report, page 112).

Dealing with what would constitute an ''actual'' effect is the dilemma posed by the statutory language. EPA's interpretation of the broader Title X framework suggests that lead-based paint hazard standards should not be based on absolute certainty. If the EPA were to follow Congress' literal wording, available evidence would only allow the Agency to set unreasonably high dust, soil, or paint hazard standards. EPA does not believe that this is an appropriate formulation of Congressional intent. As stated in section 1103(3), one purpose of Title X is ''to encourage effective action to *prevent* childhood lead poisoning'' (emphasis added). To follow this directive, EPA needs to establish hazard standards that predict adverse health outcomes based on their environmental observations and measurements. Due to the large amount of variability in the relationship between environmental lead levels and blood-lead concentrations, it is not possible to state with certainty that a given set of environmental conditions would result in an actual adverse outcome. EPA, therefore, has not used an absolute certainty criterion but rather interprets the statute to require a level of certainty regarding risk that is higher than that used for the contamination standard—the ''level of concern.''

It is possible, however, to state that there is a relatively high likelihood that an adverse outcome will occur. The dilemma the Agency faces in this case would be that hazards would be identified only at the very highest levels. Thus, for example, EPA could say that adverse effects ''would result'' only when an individual child has a 100 percent probability of having a blood-lead concentration equal to or exceeding 10 μg/dl. Using this 100 percent probability criterion as the basis for setting hazard standards, however, would contribute little, if anything, to the statutory intent of preventing adverse effects. Moreover, the environmental lead levels associated with this probability level would be so high that they would likely apply to only a very small number of situations--for example, soil levels well over 5,000 ppm or dust lead levels well over 500 μg/ft^2. Children exposed to significantly lower levels could be subject to substantial risk that would be ignored in the national lead program. Therefore, EPA has elected not to use such a formulation.

Accordingly, EPA examined the statute and its legislative history for guidance on how to select appropriate parameters for identifying lead-based paint hazards. Based on this analysis, the Agency concluded, for the following reasons, that the hazard standards should be based on a set of parameters identified by balancing the costs of reducing exposures to lead-based paint hazards with the benefits of avoiding adverse human health effects.

First, the identification of lead-based paint hazards is linked with hazard reduction in many provisions of Title X, including sections 1011(e)(8) and (9), 1012(a) and (e), and TSCA section 401(8) and (13). This linkage suggests that measures taken to reduce hazards should be consistent with the risks presented. The Senate Report, recognizing that many property owners would implement interim controls to respond to lead-based paint hazards, states that ''interim measures should be commensurate with the degrees of risk reported by the risk assessment'' (p. 115). The Report is most explicit in its discussion of lead-based paint hazard reduction in Federally assisted and insured housing, where it states that ''the response would correspond to the degree of danger and the benefit to be achieved'' (p. 117). Cost-benefit balancing is a reasonable method that can be used to assist EPA in setting hazard standards that would promote control activities that are commensurate with risk.

Second, cost-benefit balancing is a useful method to examine the potential for adverse effects, the resource allocation that should be associated with reducing that potential, and methods of public protection when the available scientific evidence shows there is a wide range of uncertainty in the risks that may be associated with any particular levels. The Senate Report recognized that there is a wide range of responses applicable to lead-based paint and paint hazards depending on the degree of risk and the likelihood of risk reduction that could occur from any particular action. In particular, property owners can choose to reduce hazards through ''abatement'' (permanent elimination of hazards) or ''interim measures'' (temporary exposure reduction). See TSCA sections 401(1), (8), and (13). The Senate Report at 113-115 specifically refers to this wide range of applicable responses and the need to consider measures commensurate with the risk. The Senate Report at 113 states that housing owners

> will choose to abate or partially abate when they determine that it is cost effective for them to permanently eliminate the source of hazards.

Further, the Senate Report at 115 states that interim measures

> should be commensurate with the degree of risk reported by the risk assessment. Thus, where moderately elevated dust levels exist but there is little deterioration in the paint, an appropriate interim response might be limited to supercleaning leaded surfaces. Where children are present and paint is peeling, interim controls might require a more substantial effort and expense to prevent exposure from paint chips and dust.

Given these standards, EPA believes that it is a reasonable interpretation of TSCA section 403 to identify the conditions that constitute lead-based paint hazards by considering the weight of evidence on the range of environmental lead levels that would result in particular blood lead levels, the adverse effects associated with those blood-lead concentrations, and potential ranges of risk reduction (reductions in blood-lead concentration) that would result from eliminating or controlling the levels.

Several purposes of Title X also support the use of cost-benefit balancing for establishing the hazard standards. According to section 1003(2) of Title X, one purpose of the statute is ''to implement, on a priority basis, a broad program to evaluate and reduce lead-based paint hazards in the Nation's housing stock.'' The concept of priority-setting inherently recognizes that resources are scarce, and that scarce resources are most effectively employed when decision-makers apply them to the worst problems first. To develop standards that are consistent with the need to set priorities, EPA factored in the resources needed to reduce risks, the benefits of controlling lead-based paint hazards, and data on the presence of lead in residential paint, dust, and soil when selecting the proposed standards. Cost-benefit analysis is a principal analytical tool available to the Agency to measure the effectiveness of using resources to reduce human health risks.

Section 1003(3) of Title X also states that a purpose of the statute is ''to encourage effective action to prevent childhood lead poisoning by establishing a workable framework for lead-based paint hazard evaluation and reduction. . . .'' In developing today's proposal, EPA interprets the term ''workable'' to mean practical, usable, and realistic. First, a workable framework must be practical; that is, it should promote priority-setting, focusing resources on the most significant risks. Overly stringent standards that result in the identification of lead-based paint hazards in large segments of the housing stock would not be practical because they would not provide guidance to decision-makers on where to focus resources.

Second, the standards must be usable by the intended audience. Risk assessors must be able to use the standards as a tool to evaluate properties quickly at a modest cost. The standards should not require extensive and costly environmental measurement. The meaning of the standards must be sufficiently simple for risk assessors to explain and property owners, residents, and other decision-makers to understand the significance of the findings of a risk assessment.

Third, for a framework to be workable, it needs to be based on realistic goals, goals that are achievable with available resources and feasible with available technology. The standards for identifying lead-based paint hazards, therefore, need to recognize resource and technological constraints. These standards, the primary function of which is to provide guidance and advice, risk being ignored by their intended audience and having no value if they are not practical, usable, and realistic.

Section 1003(3) also refers to the Title X purpose of ''. . . ending the current confusion over reasonable standards of care.'' EPA interprets a ''reasonable'' standard to be one that requires exercise of judgment to balance the probability that harm will occur, and the magnitude and severity of that harm, against the adverse social and economic impacts on society of the action taken to reduce the harm. The reasonableness standard becomes more judgmental in the case of health risks of lead where, as a practical matter, all the scientific evidence is uncertain to some degree and EPA is forced to deal in probabilities that can vary over extreme ranges. Therefore, in evaluating a reasonable standard of care under Title X, EPA will consider the various relationships among such factors as toxicity, exposure, the effectiveness of interventions, and the cost of interventions.

EPA, further, believes that consideration of cost is consistent with the establishment of these lead standards. The purpose of the lead hazard standards is to protect the public health. To do this within the framework of Title X, however, requires the expenditure of scarce public and private resources. Ensuring that these resources are used in a manner that maximizes health protection means that EPA should establish lead hazard standards that direct resources to where the threats to public health are the greatest. EPA recognizes there are different ways in which the TSCA section 403 standards may be interpreted and, specifically, requests comment on whether it is appropriate for the Agency to use the cost-benefit analysis to develop the hazard standards for this rule.

3. *Policy basis for the standards*—a. *Dust-lead and soil-lead levels of concern*. To implement its decision to treat the dust-lead and soil-lead levels of concern as risk communication tools, EPA is proposing that the soil and dust levels of concern should be associated with a blood-lead concentration of concern and a child's probability of exceeding that blood-lead concentration (exceedance probability). As noted previously, EPA is proposing to establish a soil-lead level of concern for use in guidance and not to include it in the proposed regulation.

EPA used blood-lead concentration as the measure of human health risk, because it is the most widely used index of human lead exposure and risk. By exceedance probability, EPA means an individual child's risk or probability of having a blood-lead concentration that equals or exceeds a specified concentration. For example, if the blood-lead concentration of concern is 10 µg/dl, an exceedance probability of one percent means that a child has a one percent chance of having a blood-lead concentration that equals or exceeds 10 µg/dl.

An exceedance probability is needed because the relationship between lead in the environment and blood-lead concentration is characterized by a great deal of variability due to several factors, including differences among children in behavior and nutrition. The measurement of lead in the environment and in blood is also subject to a significant degree of variation. It is not possible, therefore, to link a specific level of lead in the environment (e.g., soil) to a specific blood-lead concentration with absolute certainty. Rather, a specific level of lead in the environment is associated with a distribution of blood-lead concentrations.

The distribution, which can be thought of as a curve drawn on a graph, represents the range of blood-lead concentrations and the relative probability that each blood-lead concentration would actually occur. A distribution is described by three parameters: the form (i.e., shape) of the distribution (e.g., normal distribution or "bell" curve, log normal distribution); a measure of central tendency (e.g., mean or average); and a measure of variability or spread (e.g., standard deviation) around the measure of central tendency. With these three parameters, the probability of exceeding any blood-lead concentration can be calculated. For further discussion of standard deviation, please see Matlack, *Statistics for Public Policy and Management* (Ref. 18).

b. *Dust-lead and soil-lead hazard standards*. Having presented its rationale, above, for using cost-benefit balancing to help develop the proposed dust and soil-lead hazard standards, EPA now explains its intent to use cost-benefit balancing in the hazard standard-setting process.

It is important to note that the Agency's analyses for dust and soil began with an examination of quantitative estimates based on various modeling techniques. These techniques allow the Agency to arrive at a range of options on which the Agency exercises its administrative judgment. Thus, the quantitative modeling is used as a tool to derive the boundaries of the Agency's inquiry, not as the sole basis for decisions.

Furthermore, the Agency wishes to note that it employed a normative analysis to support the selection of the dust-lead and soil-lead hazard standards. A normative analysis estimates costs and benefits based on the assumption that individuals will make perfectly rationale decisions in response to the standards. That is, all individuals who should conduct risk assessments will do so, and all individuals will undertake appropriate interventions in response to hazards identified by the risk assessment. This normative analysis also assumes that no action is being taken in the absence of the standards. In reality, hazards will not be identified in many homes because risk assessments will not be performed. Even if hazards are identified, interventions may not be performed or interventions different from those assumed in the analysis may be performed. In addition, risk assessments and hazard control interventions are currently being conducted.

EPA used a normative analysis for two reasons. First, as a practical matter, it is difficult, if not impossible, to estimate expected costs and benefits associated with the standards. Such estimates would require data on the current level of risk assessment and abatement, which is not available, and the Agency to predict how property owners and other decision-makers will respond to the standards. Second, the objective of the analysis is to provide estimates that allow Agency decision-makers to compare costs and benefits. Although the normative analysis is likely to overestimate actual costs and benefits, EPA believes that the relative balance of costs and benefits estimated by the analysis is unlikely to be very different from the relative balance of actual costs and benefits. Therefore, the Agency can use these estimates to evaluate various options for the dust and soil standards.

With respect to the paint component of the proposed regulation, data limitations prevented EPA from quantifying the costs and benefits of the options considered in this proposal. Data that definitively relate deteriorated paint to blood-lead concentration are not available, preventing the Agency from estimating the benefits of these options. EPA could not estimate the costs of these options because the Agency's decision regarding deteriorated lead-based paint focused on the area of deterioration on individual components whereas the available data provide information on the amount of deteriorated paint in an entire residence. Consequently, EPA's decisions with respect to the options for the paint component involve a more qualitative judgment on the part of the Agency.

As part of its economic analysis of the proposed rule, EPA developed estimates of the costs and benefits of repairing or abating deteriorated lead-based paint. The preamble presents these estimates in Unit X. The data limitations identified above as well as other analytical constraints described in Unit X, however, restrict the usefulness and call into question the reliability of these estimates in characterizing the proposed regulatory standards for paint.

While Title X provides no guidance on how to undertake cost-benefit balancing, the legislative history of TSCA provides a useful and pertinent explanation of the concept. The House Report on TSCA (H. Rep. 1341, 94th Cong., 2nd Sess. at 13-15, 32) acknowledges that cost-benefit balancing for regulation is not precise but, instead, requires the exercise of judgment by the decision-maker. It involves the balancing of the probability that harm will occur, and the magnitude and severity of that harm, against the cost of the proposed action to reduce that harm. In other words, cost-benefit balancing involves a weighing of the risks to be reduced by response actions and the costs of these actions.

The TSCA House Report emphasizes that cost-benefit balancing does not require a formal quantitative analysis under which a monetary value is assigned to risks that may be reduced by regulation or the costs to society. This is because precise values often cannot be assigned to such risks and costs. Accordingly, cost-benefit balancing is appropriately used to establish a range of options for the hazard standards. Using this approach, the Agency then selects its preferred options based on consideration of relevant factors, including the weight of the evidence of harm, assumptions and tools that underlie EPA's analysis, as well as other factors, including health protectiveness and total costs.

Cost-benefit balancing involves a two-step process: evaluation of risk and risk-reduction (i.e., benefit), followed by consideration of the resources needed to achieve varying degrees of risk reduction. Below, EPA explains first the concept of evaluating risk and risk reduction, then the concept of evaluating how to balance risk reduction (benefit) with costs.

With respect to risk, the TSCA House Report states that: ''. . .risk is measured not solely by the probability of harm, but instead includes elements both of probability of harm and severity of harm and *those elements may vary in relation to each other*'' [emphasis added]. Determining risk becomes more judgmental in the case of health and environmental risks covered by EPA in cases where the scientific evidence on hazard and exposure contains a high degree of uncertainty and variability encompassing numerous relationships among elements of risk, including consideration of the severity and probability of harm resulting from the different types of exposure that may occur. Because of the uncertainty in all of these estimates, there are generally no definitive answers as to what the risk may be. Therefore, in evaluating risk, EPA considers various factors, including the strength of the evidence on toxicity (for example, actual cases of harm from epidemiology studies or results of high-dose animal tests), the type and magnitude of effects that are predicted to occur (for example, severe effects or more subtle ones), and estimates of the numbers of individuals exposed and the levels of exposure based on mechanistic and statistical models.

Once the risk is evaluated, with the attendant uncertainties in hazard evaluation and the variations in exposure probability, the next step is to consider the costs of the regulatory action. The probability and severity of harm (in this case, a range of children's health effects) are weighed against the impact of any action EPA proposes to take to evaluate whether the costs are commensurate with risk reduction. There is, however, no set way to apply EPA's chosen approach for this rulemaking to balancing costs and risk reduction. To illustrate this point, the Agency provides the following examples. Where standards would require the high expenditure of resources, the level of risk reduction (considering both the toxicity of lead and the probabilities of exposure) and the strength of evidence should be correspondingly high. On the other hand, if the costs of standards are relatively low, the level of risk reduction and the strength of the evidence could be less compelling.

Today's proposed rule takes this balancing into account in proposing both soil and dust hazard standards. The determination on soil standards considers the fact that relatively high costs would be incurred to abate residential soils. Consequently, under a cost-benefit balancing concept, before selecting an option associated with high costs, EPA would want a greater measure of confidence that the standard would result in a higher level of risk reduction. Because the cost of reducing risk from residential dust is relatively low, EPA could select a dust-lead hazard standard that would not result in as much risk reduction.

Finally, EPA believes that this type of analysis is an appropriate way to deal with the problems caused by lead in paint and residential dust and soil. Lead is a substance for which there is no clear evidence that there is a level of exposure below which there is no risk. It is clear, however, that there is some level of lead where the use of scarce resources to reduce exposure to lead is warranted. EPA recognizes that resources needed to address risks from lead-based paint hazards are limited and would like to set standards to target responses to these hazards so that the highest risks will be addressed first. In contrast, spending valuable resources engaging in cleanup activities to achieve little or no reduction in risk would not be a reasonable approach.

B. Technical Analyses

To support the development of dust and soil lead levels of concern, as well as for the hazard standards, EPA requires a tool to relate lead in the environment to blood-lead concentration. As will be further explained below, EPA has chosen two types of models to be used for this purpose: a mechanistic model and a statistical model based on empirical data. A mechanistic model simulates the human body's response to lead that is ingested or inhaled. Because biological processes that mechanistic models are designed to simulate are not completely understood, these models are typically limited in their predictive capability. The components of the processes that are understood have to be simplified and digested into a series of mathematical equations resulting in another source of error. The data that are used as inputs into these models may not be truly representative and may contain gaps.

Alternatively, EPA could use observational data to estimate the relationship between environmental lead and blood lead. Two national data sets are available to the Agency. EPA has national blood-lead data from Phase 2 of the third National Health and Nutrition Examination Survey (NHANES III) (Ref. 6) and national data on levels of lead in dust and soil and condition of paint from the National Survey of Lead-Based Paint in Housing, conducted from 1989-1990 by the U.S. Department of Housing and Urban Development (Ref. 19). These data sets, however, are not linked. That is, there is no direct observation between blood-lead in NHANES and the environmental levels in the HUD survey. Therefore, these data sets cannot be used in combination to estimate the relationship between lead in dust and soil and blood-lead concentration.

In light of limited data and imperfect models, the Agency cannot rely on any single approach to specify the true relationship between lead in dust and soil and blood lead. EPA, therefore, used several tools to derive differing estimates of the relationship. The mechanistic model used for the various analyses in this proposed rule is the Agency's Integrated Environmental Uptake and Biokinetic (IEUBK) model. EPA also conducted several analyses for this rule using data from the Rochester Lead-in-Dust study, which contains data for children's blood-lead concentrations and dust and soil-lead levels in their environment (Ref. 20). These tools will be discussed further below in the sections where they are used.

The Agency wishes to note that the differing estimates of the relationship between environmental lead and blood-lead concentration do not bound the range of options available to EPA for the proposed rule. The true relationship between blood-lead and dust and soil-lead could be stronger or weaker than the estimates used in this proposed rule.

1. *Dust-lead and soil-lead levels of concern*. This section of the preamble presents the Agency's rationale for its choice of 10 µg/dl as the blood-lead concentration of concern, and for its choice of the appropriate exceedance probability of one to five percent. EPA then explains how it identified the dust and soil-lead levels at which the Agency reasonably expects an individual child would have a probability of approximately one to five percent of having a blood-lead concentration equal to or exceeding 10 µg/dl.

a. *Blood-lead concentration of concern*. EPA has determined that the weight of scientific evidence, as discussed below, shows that 10 µg/dl is a reasonable level of concern for childhood blood lead under the applicable statutory standard of ''poses a threat.'' EPA disagrees that the term ''poses a threat'' suggests that the lead levels of concern should be based on any non-zero risk (zero-risk basis). Zero risk equates to a blood-lead concentration of zero because there is no known health effects threshold for lead. EPA, however, proposes to reject the zero risk basis for dust and soil-lead levels of concern for several reasons. First, although some data suggest that adverse health effects occur at the lowest observed levels, only a small number of children with such low blood-lead concentrations have been examined. Furthermore, the health effects at the lowest levels of exposure are small and subtle, making it difficult to associate effects with any single factor. Therefore, there is insufficient evidence at these lowest levels to state that there is a level of risk that warrants national public concern. Second, standards based on zero risk would not serve as a useful communication tool because lead is ubiquitous in the environment and there is no practical way to eliminate exposure. Third, EPA believes that zero risk-based standards were not the intent of Congress. If any level of lead in dust and soil constitutes contamination or a hazard, there would be no need for EPA to identify these conditions.

Having rejected zero as the blood-lead concentration basis for dust and soil-lead levels of concern, EPA had to identify an alternative blood-lead concentration. Numerous human epidemiological and clinical studies, as well as animal toxicological and *in vitro* studies indicate clear signs of toxicity across a wide range of exposures. While the results of human studies are not uniform, and there is inevitably uncertainty regarding the precise nature and persistence of effects at low levels, these studies are predominately similar in their overall findings. Furthermore, there is consensus within the expert medical community that even low levels of lead exposure warrant public health concern.

As listed below, numerous health effects, many of them neurological, have been related to blood-lead concentrations down to levels of at least 10-15 µg/dl:

1. Altered synthesis of heme as indicated by inhibitions in the enzymes delta-aminolevulinate dehydrase, pyrimidine-5-nucleotidase, and red blood cell ATPase, and accumulations of the heme precursor, erythrocyte protoporphyrin in red blood cells. (e.g., Refs. 21-29).
2. Reduction in vitamin D hormone synthesis in children (e.g., Ref. 30).
3. Alterations of brain electrical activity in children (e.g, Refs. 31-37).
4. Altered nerve conduction in auditory pathway and decreased hearing acuity in children (e.g., Refs. 34 and 38).
5. Delays in cognitive development and slower sensory-motor development during infancy (e.g., Refs. 39-41).
6. Other neurobehavioral impacts (e.g., IQ deficits) in children (e.g., Refs. 42-48).
7. Decreased stature or growth in young children (e.g., Refs. 49-51).
8. Decreased ability to maintain steady posture in children (e.g., Ref. 52).
9. Reduced gestational age and reduced weight at birth, associated with maternal and cord blood-lead concentrations (e.g., Refs. 53 and 54).
10. Increased blood pressure in adults (e.g., Refs. 5 and 55).

While it is possible that some of these effects are reversible (e.g., altered heme synthesis), or have unclear medical or functional implications (e.g., altered brain electrical activity), the Agency believes that the collective impact of these effects on diverse physiological functions and organ systems of young children with blood-lead concentrations as low as 10 µg/dl are clearly adverse. This conclusion is consistent with the findings of other EPA reports, EPA's Clean Air Scientific Advisory Committee (CASAC), the Centers for Disease Control and Prevention in their 1991 statement *Preventing Lead Poisoning in Young Children*, and the National Academy of Sciences in their 1993 report *Measuring Lead Exposure in Infants, Children, and Other Sensitive Populations*.

U.S. EPA's 1986 Air Quality Criteria Document for Lead (Ref. 56) concluded that for children: (1) The collective impact of the effects at blood-lead concentrations above 15 µg/dl represents a clear pattern of adverse effects worthy of avoidance; (2) at levels of 10-15 µg/dl there appears to be a convergence of evidence of lead-induced interference with a diverse set of physiological functions and processes, particularly evident in several independent studies showing impaired neurobehavioral function and development; and (3) the available data do not indicate a clear threshold at 10-15 µg/dl, but rather suggest a continuum of health risks approaching the lowest levels measured. The health effects below this range are less well substantiated.

In reviewing the information presented in the 1986 Air Quality Criteria Document and Addendum, EPA's CASAC concluded various effects starting at blood-lead concentrations around 10-15 µg/dl or even lower in young children ''may be argued as becoming biomedically adverse'' (Ref. 57). After reviewing the 1990 Supplement to the Addendum (Ref. 58), as well as a staff position paper of EPA's Office of Air Quality Planning and Standards (Ref. 59), CASAC concluded that blood-lead concentrations above 10 µg/dl clearly warrant avoidance, especially for the development of adverse human health effects in sensitive populations. The Committee concluded ''that EPA should seek to establish an air standard which minimizes the number of children with blood-lead concentrations above a target value of 10 µg/dl. In reaching this conclusion, the Committee recognizes that there is no discernible threshold for several lead effects and that biological changes can occur at lower levels'' (p. 1, Ref. 57).

In their 1991 Statement, CDC revised the action level for the lead screening and intervention program from 25 µg/dl set in 1985 to 10 µg/dl and stated that ''the scientific evidence showing that some adverse effects occur at blood-lead concentrations at least as low as 10 µg/dl in children has become so overwhelming and compelling that it must be a major force in determining how we approach childhood lead exposure'' (p. 1, Ref. 2). While CDC does not specify which of the many effects associated with low-level lead exposure are individually considered adverse, the following discussion indicates that the collective impact of the different effects poses risks that should be avoided (pp. 9-10, Ref. 2):

Blood-lead concentrations as low as 10 µg/dl, which do not cause distinctive symptoms, are associated with decreased intelligence and impaired neurobehavioral development (Refs. 60-61). Many other effects begin at these low blood-lead concentrations, including decreased stature or growth (Refs. 49, 50, and 51), decreased hearing acuity (Ref. 38), and decreased ability to maintain a steady posture (Ref. 52). Lead's impairment of the synthesis of the active metabolite 1,25-$(OH)_2$ vitamin D is detectable at blood-lead concentrations of 10-15 µg/dl. Maternal and cord blood-lead concentrations of 10-15 µg/dl appear to be associated with reduced gestational age and reduced weight at birth (Ref. 62). Although researchers have not yet completely defined the impact of blood-lead concentrations <10 µg/dl on central nervous system function, it may be that even these levels are associated with adverse effects that will be clearer with more refined research.

CDC recommends that community-wide interventions (e.g., outreach and education, surveillance) should be considered by appropriate agencies if many children have blood-lead concentrations that equal or exceed 10 µg/dl (Ref. 2).

The National Academy of Sciences agreed with the CDC assessment of the existing studies and data, noting that blood-lead concentrations around 10 µg/dl are associated with disturbances in early physical and mental growth and in later intellectual functioning and academic achievement (Ref. 63).

For purposes of this proposed rule, EPA is establishing 10 µg/dl as the blood-lead concentration of concern. This decision is based on EPA's review of the scientific evidence and earlier Agency findings that a number of health effects begin to manifest themselves at blood levels of 10-15 µg/dl and that the collective impact of these effects poses risks that should be avoided. EPA chose the level at the lower end of this range to provide an adequate margin of safety. EPA decided not to establish a level lower than 10 µg/dl because the evidence indicates that health effects at lower levels of exposure are less well substantiated, based on a limited number of studies, a limited number of children, and observation of subtle molecular changes that are not currently thought to be sufficiently significant to warrant national concern.

b. *Exceedance probability*. Unlike EPA's choice of the blood-lead concentration, where there is a body of scientific literature to guide the decision-making process, there is no scientific evidence to assist the Agency in selecting the appropriate exceedance probability. EPA's decision for this value is, instead, guided by judgment about levels of risk that are achievable and consistent with the statutory criteria.

EPA looked at several options for an appropriate exceedance probability. The Agency rejected the lowest possible probability, which is zero, because it is unachievable. The Agency's risk analysis demonstrated that a very small percentage of children would have blood-lead concentrations equaling or exceeding 10 µg/dl even if there were no lead-based paint and lead-contaminated soil and dust, because other sources of exposure (e.g., air, water, diet, and background levels of lead) remain (Ref. 1).

At the other end of the range considered by EPA was an exceedance probability of 10 percent. With this distribution of risk, a child would have a 1.6 percent chance of having a blood-lead concentration exceeding 15 µg/dl and a less than one percent chance of having a blood-lead concentration exceeding 20 µg/dl, the level at which CDC recommends medical intervention. The Agency rejected this probability as presenting risks above the threshold that the dust and soil-lead levels of concern are supposed to communicate.

Consequently, the Agency determined that the range of probabilities between one and five percent would be consistent with the statutory criterion for level of concern, ''pose a threat.'' Given the data and analytical tools available to EPA, the Agency determined that, as a practical matter, one percent is not distinguishable from five percent. This overlap is due to the uncertainty and variability related to any effort to associate levels of lead in the environment to blood-lead concentrations and limited data.

As a result of exposure to levels of lead in dust and soil associated with these probabilities, a child would have a relatively small chance of having a blood-lead concentration equal to or exceeding 10 µg/dl. The Agency considers this small chance of exceeding the blood-lead concentration of concern to be consistent with ''pose a threat.'' Consequently, EPA is proposing to include in guidance a level of concern where the levels of lead in dust and soil are associated with a one to five percent probability that a child would have a blood-lead concentration equal to or exceeding 10 µg/dl.

In seeking comment on this decision, EPA is interested in obtaining any information that would provide additional support for its decision or support the selection of another option.

c. *Characterizing individual risk*. EPA identified several alternative tools to support the development of the dust and soil-lead levels of concern: (1) The Agency's IEUBK model; (2) a ''multimedia'' model based on the data from the Rochester Lead-in-Dust study; and (3) a performance characteristics analysis of the Rochester data. The IEUBK model was not used to examine dust lead levels because the model uses dust-lead concentration and, as explained in Unit V. of this preamble, EPA has decided to propose a loading standard for dust. Conversely, the multimedia model based on the Rochester data was used only for dust. It uses dripline soil lead measurements rather than yard-wide average and, therefore, EPA chose not to use it to examine the levels of concern for lead in soil in this proposal. EPA used the performance characteristic analysis of the Rochester data for both the dust and soil-lead levels of concern.

d. *Dust analyses*. EPA conducted two analyses to support development of the dust-lead level of concern: an analysis that used the multimedia model based on the Rochester data and a performance characteristics analysis of the Rochester data. The multimedia model was developed specifically to support the development of options for this proposed rule. It is a regression model that relates environmental lead levels in dust and soil observed at a residence to the blood-lead concentration measured for a child living at the residence. Regression analysis is a statistical technique used to estimate the dependence of one variable upon others, in this case the dependence of a child's blood lead level on the environmental lead levels measured in and around his or her home. For a detailed discussion of regression analysis please see Matlack, *Statistics for Public Policy and Management* (Ref. 18).

EPA decided to use the data from the Rochester Lead-in-Dust Study as the basis for the multimedia model for the following reasons: (1) Dust on all surfaces that are being considered for the TSCA section 403 standards were measured for lead in the Rochester Study; (2) the Rochester Study includes dust-lead loadings from wipe sampling and the TSCA section 403 dust standard is expected to be based on dust-lead loading from wipe sampling; and, (3) the selection of homes and children in the Rochester Study, although targeted, was more random and more representative of a general population than is the case with other recent epidemiological studies of lead exposure in urban environments where lead-based paint is a significant source of lead in dust and soil.

The multimedia model can be used to predict an average blood-lead concentration for an individual child who is exposed to a given set of environmental-lead levels. A constant empirical estimate of variability is applied to this average to estimate a distribution of blood-lead concentrations. In statistical terminology, this estimate of variability is referred to as the geometric standard deviation (GSD), a type of ''standard deviation'' that is used for log normal distributions. The GSD in this case characterizes biological and behavioral variability in blood lead for a given set of environmental exposures. The predicted distribution can then be used to estimate the probability of a child exceeding a specified blood-lead concentration for a given level of environmental exposure.

Because, in this case, EPA was interested in determining the environmental-lead levels that would result in a one to five percent probability of an individual having a blood-lead concentration equal to or exceeding 10 µg/dl, the Agency started with the specified range of probabilities of a child having a blood-lead concentration equal to or exceeding 10 µg/dl and calculated the level of lead in dust needed to predict this distribution.

The Agency selected a GSD of 1.6 for use in the multimedia model, consistent with the default value used in the IEUBK model. This value was based upon the GSDs calculated for various sites after differences in site-specific dust and soil-lead measurements were removed. In this way, the GSD reflects the behavioral and biological variability in children as well as repeat sampling variability, sample location variability, and analytical error. Because EPA is using the multimedia model to predict a blood lead distribution for a fixed level of lead in the environment, it is appropriate to use a GSD that accounts for these sources of variability but not differences in environmental lead levels. Median GSDs, weighted by sample size within subgroups defined by age, dust-lead concentration, and soil-lead concentration were estimated as 1.69 for Midvale, Utah, 1.53 for the Baltimore data from the Urban Soil Lead Demonstration Project, and 1.60 for Butte, Montana (see section 4.2.2, Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children). Given these results, the Agency believes that 1.6 is a reasonable value for the GSD in this application.

EPA presents a more detailed description of the multimedia model in the Risk Analysis to Support Standards for Lead in Paint, Dust, and Soil, which can be found in the public record for this proposal (Ref. 1).

The multimedia model yielded the following results. The levels of lead in dust on uncarpeted floors associated with an individual child having from a one to five percent chance of having a blood-lead concentration equal to or exceeding 10 µg/dl range from near zero to 6.7 µg/ft^2, depending on the dust-lead loadings on window sills and the concentration of lead in soil. The range for dust loadings on window sills is from near zero to 74 µg/ft^2 depending on dust-lead loadings on floors and the concentration of lead in soil. The results of this analysis are presented in Chapter 5 of the Agency's risk analysis document (Ref. 1).

These values are far below current clearance standards in both EPA guidance and HUD Guidelines and some are near or below background levels. These results depend on the model that has been fitted to the Rochester data. If the model changes by including different variables or selecting a different shape or form, the results could be higher or lower. Therefore, an alternative approach that does not depend on a model was also employed to estimate the levels of lead in dust associated with a one to five percent probability of a child having a blood-lead concentration equal to or exceeding 10 µg/dl.

The non-modeling approach or performance characteristics analysis of the Rochester data utilizes the concept of negative predictive value (NPV), which, in this case, is defined as the probability of a child having a blood-lead concentration below a specified level given that the observed environmental lead level is below a hypothetical standard. EPA used the performance characteristics analysis to estimate the dust loading on uncarpeted floors and interior window sills that would yield an NPV from 95 percent to 99 percent with a blood-lead concentration equal to or exceeding 10 µg/dl. This range of NPVs is equivalent to a one to five percent chance of having a blood-lead concentration equal to or exceeding 10 µg/dl.

Table 2 below illustrates how NPV is computed. Homes in the Rochester study are classified into four categories according to two factors: (1) whether or not environmental-lead levels measured at the home were below or above the example standard, and (2) whether or not the home had a child with a blood-lead concentration above or below 10 µg/dl. Using the notation presented in Table 2, the sum a + c is the number of homes with environmental-lead levels below an example option for the standards. The NPV is the ratio c/(a + c) and is the portion of these homes that do not contain a child with a blood-lead concentration at or above 10 µg/dl. An NPV close to one suggests that almost all of the children living in homes with environmental-lead levels below the example standards have blood-lead concentrations less than 10 µg/dl. An NPV close to zero suggests that very few of the children living in homes with environmental-lead levels below the example standards have blood-lead concentrations less than 10 µg/dl.

The performance characteristics analysis yielded the following results. For uncarpeted floors, dust-lead loadings ranged from 50 µg/ft^2 to 400 µg/ft^2 depending on the dust-lead loading on interior window sills and the soil-lead concentration. For interior window sills, dust-lead loadings ranged from 100 µg/ft^2 to 800 µg/ft^2 depending on the dust-lead loading on uncarpeted floors and the soil-lead concentration. These ranges are significantly higher than the ranges yielded by the multimedia approach (Ref. 64).

Table 2.—Definition of Negative Predictive Value Based on Empirical Data from Lead Exposure Studies*

Blood-Lead Concentration Target Level	Media Standard	
	Below Media Standard	Above Media Standard
At/Above 10 µg/dl	a	b
Below 10 µg/dl	c	d

*In the table above, the letter ''a'' represents the number of children who have a blood-lead concentration above a given blood-lead standard and who live in a residence with an environmental lead level below a standard for that environmental medium. Letters ''b,'' ''c,'' and ''d'' represent similar counts. From these counts the negative predictive value (the probability of a resident child having a low blood-lead concentration given that the observed levels of lead in the environmental media are below the standard at the residence) is calculated as c/(a + c).

There are also limitations in the use of the performance characteristics model. Like the multimedia model, this approach is based on data collected from a single city which may not be representative of the nation and has not been subjected to rigorous review. In addition, the NPVs associated with some options are based on small sample sizes, which reduces the reliability of the estimate. It is also important to note that the NPV is purely descriptive and not based on any assumptions about the true distribution of children's blood-lead concentrations. It merely describes the characteristics of a given data set.

e. *Soil analyses*. EPA also used two analyses to support development of the soil-lead level of concern: an analysis that used the IEUBK model and one that used the performance characteristics analysis of the Rochester data. The IEUBK model is a simulation model that estimates the uptake pathways of environmental lead and the body's biological response to environmental lead levels to predict a child's body burden of lead. The model considers exposure (i.e., levels of lead in dust, soil, air, water, and diet), intake (i.e., rates of ingestion and inhalation), uptake (i.e., absorption in the lung and gut), and biokinetics (i.e., movement through the blood and tissues and elimination). The model predicts a geometric mean (i.e., a type of average) blood-lead concentration for children exposed at the specified environmental lead levels. An assumed geometric standard deviation (GSD) is then applied to estimate the distribution of blood-lead concentrations from which a probability of exceeding a specified blood-lead concentration can be derived. As was the case with the multimedia model analysis for dust, a GSD of 1.6 was assumed for this analysis.

EPA chose to use the IEUBK model to support this rule because it is the Agency's most rigorously developed and thoroughly reviewed model for childhood lead exposure. This model has historically been used in other Agency programs and is the currently recommended tool for site-specific evaluations in the CERCLA (Superfund) and RCRA corrective action programs. Also, an earlier version of the model was peer-reviewed and found acceptable as a tool for setting air lead standards by EPA's Clean Air Science Advisory Committee of the Science Advisory Board (Ref. 57). The IEUBK model was calibrated using environmental-lead and blood-lead data from two western communities: Midvale, UT, a suburb of Salt Lake City (Ref. 65), and East Helena, MT, a small town outside of the State capitol at Helena (Ref. 66). Subsequent evaluations have shown that the IEUBK model provides reasonable descriptions of other sites, including urban sites (Ref. 67). The most current version, Version 0.99d, of the IEUBK model was used in the TSCA section 403 risk assessment.

The IEUBK model yielded the following results. Soil-lead concentrations generally at or below 500 parts per million (ppm) will result in a one to five percent probability that a child will have a blood-lead concentration that equals or exceeds 10 μg/dl depending on the level of lead in dust. The results of this analysis are presented in Chapter 5 of the Agency's risk analysis document (Ref. 1).

Of course, there are inherent uncertainties in any model that simulates extremely complex relationships such as that between environmental lead and blood lead. Not all of the relevant physiological factors are thoroughly understood and others are necessarily simplified. Also, there is child-to-child variability in factors related to both exposure and biokinetic response (e.g., hand-to-mouth activity, nutritional status). While the IEUBK model application attempts to address these through selection of the GSD, it is expected that deviations from the predicted blood-lead distributions would most likely manifest themselves at the extremes, or ''tails,'' of the distribution.

Recognizing that such uncertainties exist, the Agency choose to also make use of a non-modeling approach with data from the Rochester study. A performance characteristics analysis was conducted, as was described earlier for dust. The analysis yielded the following results. Soil-lead concentrations ranged from 200 ppm to 1,500 ppm depending on dust-lead loadings on uncarpeted floors and interior window sills and the exceedance probability. The wide range of soil-lead levels is largely the result of a small number of data points.

2. *Dust-lead and soil-lead hazard standards*. As discussed in section A of this unit, EPA believes it is reasonable to use cost-benefit balancing to develop a range of viable options for the dust and soil hazard standards. The risk reduction achieved as a result of interventions designed to control or eliminate hazards constitutes the benefits of the hazard standard. Dust interventions reduce risk by reducing dust-lead levels. Soil interventions reduce risk both by reducing soil-lead levels and by reducing lead contamination of household dust.

To estimate benefits, the Agency built on the analysis used to support development of the dust and soil-lead levels of concern. EPA used the models that relate environmental lead to blood lead to estimate the current or baseline distribution of blood-lead concentrations for young children and the predicted blood-lead distribution following hazard control interventions implemented in response to the standards. Risk reduction, quantified in terms of avoided health effects, is measured by looking at the change in blood-lead distributions. EPA's normative economic analysis calculated benefits by assigning a dollar value to the avoided adverse health effects and compared these benefits to the costs of hazard control interventions.

Before presenting the detailed description of the analysis, EPA wishes to highlight two issues that the public should consider when reviewing this proposed regulation. First, the Agency's analysis estimates the benefits of primary prevention. Primary prevention is the term used to characterize actions taken to protect people that have not yet been exposed to a hazard. In this analysis, baseline risk is the level of risk that the Agency would expect children to experience in the absence of lead hazard control (i.e., risk associated with exposure to current conditions). The post-intervention risk is the level of risk that children, who have had no previous exposure to lead-based paint hazards, are expected to experience with these controls in place. In essence, the analysis estimates the level of risk prevented rather than the level reduced. Where hazards are controlled, the exposure to lead-based paint hazards never occurs.

The analysis does not estimate the benefits of secondary prevention, the term used to characterize actions taken to protect people already exposed to a hazard. Primary prevention is thought to be more effective than secondary prevention because, with primary prevention, children's risk remains at the pre-exposure level. With secondary prevention, risk does not drop to pre-exposure levels because lead that is stored in bone tissue continues to be released into blood for some period of time even after environmental levels decline.

Many of the available exposure studies focus on the impacts of secondary prevention, relating environmental lead to blood lead prior to and after hazard control interventions. Because the subjects in these studies have had prior exposure, the magnitude of the risk reduction is smaller than estimated in EPA's analysis, which focuses on children who have not had previous exposure.

Second, the majority of the benefits estimated by EPA are derived from avoided IQ point loss resulting from prevented exposure to lead. The dollar value placed on these benefits is a tool to assist EPA in comparing costs and benefits for purposes of this proposed rule. It is not in any sense a real value of the risk reduction or an Agency standard for other actions. There are plainly many benefits that are not measured in the analysis because EPA lacks the tools and or data or because some benefits are subjective in nature. On the other hand, EPA assigns risk reduction value to fractional losses of an IQ point--tenths and even hundredths of a point, and it is unclear the extent to which such small changes affect quality of life of a single individual. By this combination of underestimating and overestimating dollar values of potential risk reduction benefits, EPA hopes to arrive at some reasonable range of values that can be used to inform decision-making.

a. *Estimating risk reduction*. EPA's risk analysis that was conducted to support this proposed rule provides a methodology for measuring risk reduction (i.e., declines in blood-lead concentrations). Under this methodology, EPA estimates the current national distribution of blood-lead concentrations for the population of children ages one to two. The Agency then uses this methodology to predict future changes in the blood-lead distribution resulting from the implementation of hazard interventions and expected changes in the nation's housing stock.

EPA used two models to estimate blood-lead concentrations: the IEUBK model and an empirical model based on the Rochester data. The empirical model is based on the multimedia model, which was described earlier in this unit. In order for the multimedia model to be used for national estimates, it was necessary to modify it to employ environmental measures from the HUD National Survey (Refs. 8-9 and 19). The resulting modified model is termed the empirical model. For a full explanation of the differences between the multimedia model and the empirical model, please see Chapter 5 of the Agency's risk analysis document (Ref. 1). As noted above, the multimedia model could not be used to support the development of the soil-lead of concern. The Agency is requesting comment on the use of the empirical model to support development of the soil-lead hazard standard.

To estimate the national distribution of blood-lead concentrations, EPA had to run the empirical model with nationally representative data on lead in dust and soil. The Agency used the HUD National Survey, which is recognized as the leading source of data on environmental lead levels in residential environments. The design and findings of the HUD National Survey have been peer-reviewed and published in several government reports.

For each house in the National Survey, EPA estimated the average blood-lead concentration by using the HUD data on dust lead and soil lead as inputs into the empirical and IEUBK models. EPA then applied the GSD of 1.6 to estimate a geometric mean blood-lead concentration for each home to derive a distribution of blood-lead concentrations for each home. An estimate of the baseline national distribution of blood-lead concentrations was constructed by aggregating the distributions from each home using population weights based on the 1993 American Housing Survey (Ref. 68), adjusted to the 1997 population of children (aged 1 to 2 years). EPA then scaled the estimated national baseline distribution using the blood-lead data from NHANES.

EPA used the following process to estimate the national blood-lead distribution associated with each option for dust and soil hazard standards. The soil and dust levels for each home in the survey were compared to a set of hazard standard options for dust and soil. For each set of options, the dust-lead level was adjusted down to reflect implementation of a dust control intervention if the dust-lead level exceeded the option for dust. If the soil-lead level exceeded the option for soil, both the soil and dust lead levels were adjusted down to reflect implementation of a soil control intervention. If a level did not exceed an option, no adjustments to the data were made. Once this comparison was made, the adjusted data were run through both models to obtain an estimated blood-lead concentration predicted by the model. The GSD of 1.6 was then applied to generate the blood-lead distribution for each HUD survey home. The blood-lead distributions for all homes in the survey were then aggregated using the same weights as in the baseline analysis described previously.

The use of the IEUBK model to estimate the risk reduction associated with various options for the dust-lead hazard standard merits additional explanation. As noted earlier, the IEUBK model could not be used to develop options for the dust-lead level of concern because the dust standards are in terms of loading and the IEUBK model uses dust concentration as its input. How, then, can the IEUBK model be used to analyze options for the dust-lead hazard standard? In contrast to the dust-lead level of concern, where a model that directly relates a dust-loading value to a distribution of blood-lead concentrations is needed, analysis of the options for the dust-lead hazard standard requires a model to estimate changes in the blood-lead distribution for the population of young children. EPA is able to do this with the IEUBK model by using the model with the HUD National Survey data.

The HUD National Survey data contain both dust-lead loading and concentration data for each home. To establish the baseline distribution of blood-lead concentrations, EPA used the dust-lead concentration value for each home as input for the IEUBK model. To estimate the blood-lead distribution associated with a set of hazard standard options for dust and soil, EPA identified the homes that would exceed the paint, dust (loading), and/or soil standards. For these homes, the analysis assigned a post-intervention dust-lead concentration based upon the post-intervention soil concentration and the presence or absence of deteriorated paint. The analysis then used these assigned dust-lead concentrations as input to the IEUBK model to generate post-intervention blood-lead distributions for each of the homes. For the homes where no standard was exceeded, the measured dust-lead concentration from the HUD survey was used. The details of the procedure used to assign post-intervention dust-lead concentrations are fully explained in Chapter 6 of the Agency's risk analysis document (Ref. 1). The Agency is requesting comment on the use of this application of the IEUBK model to support development of a dust-lead *loading* hazard standard.

While all young children could be affected by exposure to lead, the population of interest for this analysis was U.S. children aged 1 to 2 years. The selection of this age range as the population of interest derived from the following general observations: the central nervous system is rapidly developing in this age range, making it highly susceptible to the effects of lead; synaptic density of the frontal lobe of the brain peaks in a child's second year, and synaptic development can be disrupted or delayed as a result of lead exposure; the existence of a relationship between blood-lead concentration measured at 1 to 2 years of age and IQ scores measured later in life; blood-lead concentration tends to peak in this age range, due to an increased ability to absorb lead; and, hand-to-mouth activity is high in this age range, thereby increasing the potential for ingesting lead-contaminated dust, soil, and paint.

b. *Estimating costs and benefits*. The normative economic impact analysis estimates the benefits and costs associated with a broad range of options for hazard standards. Benefits and costs are estimated over a 50–year time frame.

Net benefits are computed by subtracting the costs from the benefits for each option and discounting each to the present using a three percent rate.

The benefits include a value for each of three health outcomes associated with declines in blood-lead concentration: avoided IQ points lost; avoided incidence of IQ below 70; and avoided incidence of blood-lead concentrations exceeding 20 μg/dl. The costs include the expenditures on the hazard control interventions implemented by property owners and other decision-makers in response to the standards. Interventions include dust cleaning, interior and exterior paint repair and abatement, and soil abatement.

The underlying engine of the normative economic analysis is the ''birth trigger'' model. The chief feature of this model is the assumption that property owners do not undertake hazard control actions until a young child who could be harmed by the hazard is present. The timing of testing and intervention, therefore, is governed by the birth rate. In the first year of a model run, the model randomly assigns the arrival of a child to some of the 284 homes in the HUD National Survey data set. In homes where a child's arrival is predicted to occur, the model uses the risk analysis methodology to estimate a post-intervention blood-lead distribution for that home. In the other homes, interventions are not undertaken, regardless of the environmental conditions, and there is no change from the baseline blood-lead distribution. Using the risk analysis methodology, the blood-lead distributions for each home in the survey are aggregated to develop a new national blood-lead distribution after the first year. The Agency compares the post-intervention blood-lead distribution in each year to the baseline blood-lead distribution to compute the reduction in blood-lead concentrations associated with the option being evaluated. The analysis is then repeated for each of the following years through year 50.

The operation of the model in each of the subsequent years differs from the initial year in two respects. First, the analysis determines whether interventions need to be repeated. For example, paint repairs are assumed to last 4 years, and therefore need to be repeated to maintain their effectiveness. Second, the weights assigned to each home in the survey, which reflect the proportion of the national housing stock represented by that sample home, change to reflect ongoing changes in the housing stock. With each passing year, new homes are built and old homes are destroyed. In fact, the modernization of the housing stock results in ''natural'' interventions as older homes that have lead-based paint are replaced by new homes that do not.

The analysis then converts the change in blood-lead concentrations into the three health endpoints: avoided lost IQ points, avoided incidence of IQ below 70, and avoided incidence of blood-lead concentrations above 20 μg/dl. The term ''avoided'' is the difference in health measures between the baseline scenario which assumes no intervention activity and post-intervention scenarios, each of which assumes a different combination of lead hazard standard options and hence intervention activities.

To estimate the economic value of avoiding lost IQ points, the analysis must first convert changes in blood-lead concentration to changes in IQ. The analysis then assigns a monetary value to the IQ point loss by using an estimate of the foregone lifetime income due to IQ point loss. The computation of IQ point loss is based on an average decrease of 0.257 IQ points per increase of one μg/dl in blood-lead concentration (Ref. 48).

IQ affects income through ability, education, and labor force participation. The estimation procedure, therefore, has two major steps. First the present value of the earnings stream of an average newborn is estimated. Second, available economic literature was used to estimate the percentage increase in lifetime earnings one would expect from a one point increase in IQ. Based on this procedure, the analysis assigns a value of $8,346 per IQ point lost (1995 dollars) (Refs. 48, 69-71).

EPA's estimate of the incidence of IQ score less than 70 is based on results in a paper by Wallsten and Whitfield (1986) on the relationship between reduced IQ scores and blood-lead concentration (Ref. 72). The economic value of avoiding cases of IQ less than 70 is approximated by using avoided special education costs. As defined, these education costs are incurred from age 7 through age 18.

Avoided cases of blood-lead concentration exceeding 20 μg/dl is obtained directly by comparing the distribution of post-intervention blood-lead concentrations with the baseline distribution of blood-lead concentrations. The monetary value was approximated by using avoided compensatory education costs. In this case, the education costs are assumed to be incurred from age 7 through age 9. In addition, there are medical monitoring and intervention costs associated with children who have blood-lead concentrations that exceed 20 μg/dl (Refs. 2, 73, and 74).

Benefits accrue over time as hazard control interventions are conducted, reducing children's exposure to lead in paint, dust, and soil. All benefit estimates are discounted to the present using an annual rate of three percent. Total benefits are the sum of benefits calculated for each year or cohort of children protected and represent the present value of the stream of benefits from the hazard controls.

The costs in this normative analysis are principally the costs of conducting interventions designed to control lead-based paint hazards. Interventions assumed to be are conducted only in those media (i.e., paint, dust, soil) where hazards are identified. For example, if lead levels in the soil exceed the hazard standards, then the soil will be removed and replaced with ''clean'' soil, but there will not be an interior paint intervention in response to elevated levels of lead in soil. Some interventions, however, include dust cleaning even if no dust hazard has been identified initially because the intervention may increase levels of lead in dust.

For purposes of this normative analysis, EPA identified six hazard control interventions. These interventions include paint repair or abatement of interior paint and exterior paint and a single intervention each for soil and dust. It was assumed that abatement of interior and exterior paint hazards occur when deteriorated lead-based paint is extensive. Paint repair occurs when deteriorated lead-based paint is present but not extensive. Soil intervention activities occur when the soil-lead concentration exceeds the soil standard. Dust hazard control occurs when the floor dust-lead loading exceeds the floor dust-lead standard, the window sill-lead loading exceeds the window sill dust-lead standard, or when it is required to accompany another intervention type, such as abatement of interior paint or soil removal. Some of the intervention actions result in permanent control of lead hazards; others need to be repeated periodically to maintain their effectiveness. According to the methodology, non-permanent interventions are repeated as necessary in a home until the child is 6 years of age.

Drawing on a variety of sources, EPA obtained unit cost estimates, that is cost per intervention per home, for the six hazard control interventions identified for the analysis (Refs. 75-79). EPA also obtained cost estimates for hazard evaluation activities (Refs. 80-83). The Agency developed separate cost estimates for single- and multi-family housing units, by adjusting the single-family unit cost estimates to reflect the smaller size of multi-family units and the smaller yards (per unit) of multi-family units. Table 3 below summarizes these costs for single-family and multi-family housing.

Table 3.—Hazard Evaluation and Control Costs

(Per activity in 1995 dollars)

Activity	Single-Family	Multi-family (per unit)
Risk assessment	456	235
Interior paint repair	437	437
Interior paint abatement	6,587	4,687
Exterior paint repair	807	182
Exterior paint abatement	45,706	12,275
Dust cleaning	391	262
Soil removal (dripline; nonhazardous waste)	2,046	399
Soil removal (mid-yard; nonhazardous waste)	7,878	777
Soil removal (both areas; nonhazardous waste)	9,008	901
Soil removal (dripline; hazardous waste)	3,443	541
Soil removal (mid-yard; hazardous waste)	16,486	1,351
Soil removal (both areas; hazardous waste)	19,013	1,617

The costs of intervention for a specific residence are a function of when a residence is evaluated, the environmental lead conditions in the residence, and the length of time that an intervention is effective (duration). The arrival of a child determines when a hazard evaluation will be conducted. The choice of intervention activities depends on the environmental lead conditions in each medium. The frequency with which interventions need to be repeated depends on the duration of the intervention. Costs for a residence accrue over time as interventions are repeated.

For example, paint abatement is assumed to have a duration of 20 years. Therefore, if post-intervention conditions are to be maintained because a child under age 6 is present, paint abatement is assumed to be repeated 20 years after the initial intervention, and again 40 years after the initial paint abatement. Costs incurred after the first year are discounted back to the present using an annual discount rate of three percent. The total cost estimate is the sum of the discounted cost of hazard controls conducted each year.

In estimating costs of each hazard standard option, the model assumes that either a lead hazard screen (for single-family units without deteriorated lead-based paint) or a risk assessment (all other units) is performed. Testing is done at the time the arrival of a child is expected and testing is not repeated for a unit.

The analysis' computation of net benefits is the difference between the total benefits estimate and the total cost estimate. Net benefits are an indicator of the societal gains from hazard controls.

When interpreting the results of EPA's analysis, it is important to consider a number of limitations, qualifications, and uncertainties which affect both the estimates of benefits and costs.

With respect to benefits, issues are associated with the methodology used to estimate baseline and post-intervention blood-lead concentrations and with efforts to place a monetary value on IQ points lost. There are important concerns with respect to the cost analysis as well.

There are four areas of concern with respect to the methodology used to estimate blood-lead distributions. The first area is associated with the HUD National Survey data. These include limited numbers of environmental samples taken at each housing unit, the sampling of only 284 houses to represent the nation's pre-1978 housing stock, the age of the study, and use of a dust collection device other than the wipe collection method being adopted by the TSCA section 403 proposal.

The limited number of environmental samples can result in the mischaracterization of dust and soil-lead levels at a home in the survey. Combined with the small number of homes sampled, mischaracterization of dust and soil-lead levels can result in large errors in EPA's estimates. The age of the study can also introduce error because environmental-lead levels have most likely changed since the data were collected in 1989-1990. The use of a dust collection device other than wipe samples required the development of an equation to convert these values to wipe-equivalent values which introduces additional error into the estimates. The introduction of error into the estimates contributes to overall uncertainty in the analytical results.

A second and significant source of uncertainty is the paucity of data with respect to the effectiveness of hazard control activities at reducing exposures to lead in paint, dust, and soil. For example, EPA's estimate of the effectiveness of interventions on dust-lead loading is based on a limited number of studies. The Agency's estimate of effectiveness of interventions on dust-lead concentrations is, in part, based on limited data and, in part, based on the best judgment of Agency scientists. Due to the lack of data about the effectiveness of interim controls to reduce exposure to lead in soil, the Agency did not include these interventions in its analysis. The Agency would, however, be interested in any data the public may have concerning the effectiveness of interim controls that address exposure to lead in soil.

Third, uncertainty is introduced by using NHANES III, Phase 2 data to calibrate the national distribution of baseline blood-lead concentrations. While the national representation of NHANES III results is widely accepted, some possible limitations in using these data include ignoring any seasonality effects on blood-lead concentrations and any further decline in concentrations that may have occurred since 1994.

Fourth, the two models are sources of uncertainty. The limitations of the IEUBK model were discussed previously in this preamble. The empirical model shares the limitations of the multimedia model discussed previously.

Questions regarding the value of IQ points fall into two categories: the relationship between blood-lead changes and IQ point changes and the monetary value assigned to IQ point losses.

There are two significant limitations involved in assigning a monetary value to IQ point losses. The first concerns the ability to assign value to fractional losses of an IQ point. The analysis assigns value to tenths and even hundredths of an IQ point which may not be of much significance at the individual level. The second concerns the value of IQ points across the range. The analysis assigns equal value to any IQ point change; the value of an IQ dropping from 140 to 135 is treated the same as an IQ dropping from 80 to 75. In contrast, it is possible that the value of a point may vary depending where in the range the point is lost.

On the other hand, the Agency notes that there are a range of other health effects (e.g., neurological, developmental, and others) that are not considered in its economic analysis (see Appendix B of the Risk Analysis to Support Standards for Lead in Paint, Dust, and Soil) (Ref. 1). Declines in children's lead exposures will also reduce the incidence of these effects. In addition, the economic analysis does not include the benefits of secondary prevention (benefits obtained by reducing environmental and blood-lead levels in a child already living in a contaminated environment). Consequently, the value associated with avoided IQ losses in the economic analysis can reasonably be considered to serve as a surrogate for benefits associated with these other effects. Therefore, to the extent that IQ-related benefits may be overestimated due to the two limitations discussed above, the non-valued benefits associated with these other effects would tend to mitigate such overestimates.

With respect to the estimate of costs, there are several sources of uncertainty. EPA's analysis identifies only a few of the dozens of responses that property owners and other decision-makers could undertake. The costs for these activities are based on current data and could change as competition among providers increases or new technologies are developed. The frequency with which temporary measures need to be repeated, which also affects costs, depends on assumptions the Agency made about the duration of the measures' effectiveness. These assumptions, in turn, are based upon judgments and extrapolations from limited data.

c. *Results*. This section of the preamble discusses the results of EPA's normative economic analysis of the options for dust and soil-lead hazard standards. Before presenting the results, however, the Agency believes that it is important to consider two issues when interpreting these results.

First, undue emphasis should not be placed on the estimates for total costs and benefits. As noted earlier, the costs and benefits estimated by the normative analysis are likely to overstate the actual costs and benefits associated with the standards. The Agency's analysis also assumes that technologies and costs will remain unchanged over the 50–year modeling horizon. Over time, as new technologies develop, costs may decline. In addition, many health benefits were not included in the analysis because either the relationship between exposure and the magnitude of health effects is unknown or because the benefits cannot be monetized.

Estimates of costs and benefits associated with the standards are also heavily influenced by the number of homes estimated to exceed any standard option. The estimated number of homes is based on the HUD National Survey. Although this Survey is the best nationally representative data on residential lead, it is characterized by several shortcomings that were described earlier. Among the most significant of these is the small sample size, which, as was noted, can introduce errors into EPA's estimates. For example, only seven homes in the Survey have soil that exceeds 2,000 ppm. Based on the age, location, and other characteristics of these homes, EPA estimates that these seven homes represent 2.5 million homes nationally which yields $9 billion in soil intervention costs over the 50–year model period. If HUD conducted another survey, it is possible that only three homes in the survey, representing 1 million homes nationally, exceed 2,000 ppm, reducing costs by 60 percent. Benefits would also be lower because fewer children would be protected. It is also possible that 10 homes in the survey, representing 3 million homes nationally, exceed 2,000 ppm, resulting in higher costs and benefits.

By providing these explanations, EPA does not intend to dismiss the costs associated with this proposed rule. Although the expected costs associated with the standards are likely to be significantly less than costs estimated by the normative analysis, these costs would probably still be substantial. That is why the Agency considered costs in evaluating options for the hazard standards and in selecting a preferred option. It should be remembered, however, that these activities will protect millions of children who will live in abated homes over the next 50 years. As was noted earlier, EPA's analysis did not focus on children already exposed to excessive levels of lead but on children who have not been born. In the absence of the standards and assuming other exposures to lead remain unchanged, approximately 10 million children are estimated to have elevated blood-lead levels over the next 50 years. Of these, one million are estimated to have levels that require medical attention (Chapter 5, Ref. 83).

Second, the results obtained using each model should be evaluated individually to compare performance of the options. Options should not be compared across models. The models represent two fundamentally different approaches to estimating the relationship between dust and soil-lead and blood-lead which are not comparable: one is mechanistic and the other empirical. As explained above, the two models also use different data for input. The IEUBK model uses dust-concentration data from the HUD survey to estimate baseline blood-lead and assumed dust-concentrations to estimate post-intervention blood-lead concentrations. The empirical model uses dust-loading data from the HUD survey to estimate baseline blood-lead and assumed dust-loadings to estimate post-intervention blood-lead. This difference is one reason why the IEUBK model-based analysis estimates greater risk reduction than the empirical model-based analysis.

The objective of the analyses is to provide EPA with a tool to compare options in terms of relative costs and benefits of each option, not to develop precise absolute estimates of costs and benefits. Despite the limitations and uncertainties noted here and in previous sections of this unit, EPA believes that the results for options within each model can be compared. The limitations may affect the estimates of absolute costs and benefits, but these limitations should have similar effects on the estimates for each option. Therefore, the impact of the limitation and uncertainties on the relative performance of each option, in terms of net benefits, estimated by each model should be small, except where noted in the discussion below.

Tables 4 and 5 below present the results of the IEUBK-based analysis for a range of dust and soil hazard standard options. Table 4 presents the costs, benefits, and net benefits for actions taken in response to the specified options for dust standards; it does not include any soil interventions. Because the IEUBK model does not include a parameter for sill dust, it was used only to analyze floor dust options. Table 5 presents figures relating to soil standards; it does not include any dust interventions. Neither table includes any testing or risk assessment costs, nor costs or benefits of paint interventions.

Table 4.—Estimated Costs, Benefits, and Net Benefits for Dust-Lead Hazard Standard Alone (Using the IEUBK Model)*

Floor Dust Options (µg/ft^2)	Number of Homes Exceeding Option (Millions)	IEUBK Model Results (50-years; $Billion)		
		Costs	Benefit	Net Benefit
50	21	12	73	61
100	19	10	59	48

*Note: Rows may not add due to rounding. This table does not include estimated costs or benefits of paint and soil interventions, or any risk assessment costs.

Table 5.—Estimated Costs, Benefits, and Net Benefits for Soil-Lead Hazard Standard Alone (Using the IEUBK Model)*

Soil Option (ppm)	Number of Homes Exceeding Soil Option (Millions)	IEUBK Model Results (50-years; $Billion)		
		Costs	Benefit	Net Benefit
500	11.8	42	149	107
1,000	5.8	28	92	65
1,200	4.7	25	82	57
1,500	3.2	16	63	47
2,000	2.5	9	45	36
2,500	1.5	6	30	24
3,000	0.7	4	19	15
3,500	0.7	4	19	15
4,000	0.7	4	19	15
4,500	0.3	1	6	6
5,000	0.2	0.4	4	4

*Note: Rows may not add due to rounding. This table does not include estimated costs or benefits of paint and dust interventions, or any risk assessment costs.

Total benefits increase as options become increasingly stringent, ranging from $59 billion to $73 billion for dust and from $4 billion to $149 billion for soil. Total benefits are a function of the number of children (which is directly related to the number of homes) affected by an option and the amount of risk reduction predicted for each child. Furthermore benefits increase at an increasing rate because, as dust and soil-lead levels decline, the number of homes at given environmental lead levels increases more quickly. For example, moving from a soil standard of 5,000 ppm to 4,500 ppm increases the number of homes exceeding the standard from about 200,000 to about 300,000 (an increase of about 100,000 housing units), while moving from 1,000 ppm to 500 ppm increases the number of homes exceeding the standard from about 5.8 million to 11.8 million (an increase of about 6 million housing units).

The rate also increases because the changes in blood-lead concentration predicted by the IEUBK model are greater for a given change in dust and soil-lead levels at lower dust and soil-lead levels. The increasing strength of this relationship between environmental lead and blood lead is sufficient to overcome the smaller changes between baseline and post-intervention dust and soil-lead levels that occur as the standard options become more stringent. For example, the assumed change in soil-lead level for a home that has a soil-lead concentration of 2,500 ppm is 2,350 ppm (the assumed post-intervention concentration is 150 ppm). The assumed change for a home that has a soil-lead concentration of 500 ppm is only 350 ppm.

Total costs also increase as options become increasingly stringent, ranging from $10 billion to $12 billion for dust and $400 million to $42 billion for soil. Total costs are mainly a function of unit costs (costs for a single intervention) and the number of homes affected. For dust, unit costs ($391 for single-family homes and $262 for multi-family units) are the same regardless of the standard being evaluated. For soil, unit costs vary depending on the part of the yard (e.g., dripline, mid-yard) being addressed by the abatement and on whether the removed soil has to be managed as hazardous waste under regulations found at 40 CFR part 260 to 40 CFR part 270. The unit cost is lower for lower soil-lead levels (below 2,000 ppm) because the removed soil does not have to be managed as hazardous waste. Table 3 above presents the complete range of unit costs for soil removal. As is the case for benefits, total costs increase as the standard options become more stringent because more homes exceed each optional standard.

Unit cost should not be confused with average cost per residence. Unit cost is the cost per intervention per residence. Average cost is the cost per residence over the entire 50–year modeling horizon and takes into account factors such as the need to repeat interventions (dust), averaging a range of unit costs (soil), and discounting (both dust and soil). Because the duration of dust intervention effectiveness is limited if the underlying source of lead is not eliminated, dust cleaning may have to be repeated, raising the average cost per residence. Average cost for soil abatement per residence will reflect a mix of soil intervention costs which vary depending on the area of the yard addressed and the type of disposal required. Interventions performed in the future are discounted back to the present. For example, the present value of a dust cleaning performed in a single-family house 40 years from now would be approximately $120 assuming a three percent discount rate.

Because total benefits increase at a faster rate than total costs, net benefits also increase as options become increasingly stringent, ranging from $41 billion to $61 billion for dust and $4 billion to $107 billion for soil. The increase in net benefits is relatively constant as the dust standards become more stringent. For soil, net benefits increase slowly from 5,000 ppm to 3,000 ppm and increase more quickly from 3,000 ppm to 500 ppm. Net benefits increase because total benefits are increasing at a faster rate than total costs. This result is primarily explained by the relationship between lead in dust and soil and blood-lead which strengthens as dust and soil-lead levels decline under the IEUBK model.

Given the large number of residences at the lower baseline dust and soil-lead levels and the small changes in these levels that would result from interventions, the results of the analysis for the more stringent options are extremely sensitive to the assumed relationship between dust and soil-lead and blood lead. If the true relationship is slightly weaker, total and net benefits could be significantly lower.

Tables 6 and 7 below present the results of the empirical model-based normative analysis for a range of possible dust and soil hazard standard options. Table 6 presents the costs, benefits, and net benefits for actions taken in response to the specified options for dust standards; it does not include any soil interventions. Table 7 presents figures relating to soil standards; it does not include any dust interventions. Neither table includes any testing or risk assessment costs, nor costs or benefits of paint interventions.

Total benefits increase as options become increasingly stringent, ranging from $25 billion to $36 billion for dust and $1 billion to $36 billion for soil. As is the case in the IEUBK model-based analysis, the rate at which benefits increase rises as the stringency of the options increase, because more homes are affected (and more children are protected). The rate at which benefits increase, however, is tempered somewhat because the relationship between dust and soil-lead and blood-lead remains relatively constant across the range of options considered. The increasing number of children protected by more stringent standards is counterbalanced by decreasing risk reduction predicted for children living in homes with low dust and soil-lead levels because the smaller changes between baseline dust and soil-lead levels and post-intervention levels at lower baseline levels equate to smaller changes in blood-lead concentration. Costs are the same as in the IEUBK-based analysis because the models are used only to calculate benefits.

Table 6.—Estimated Costs, Benefits, and Net Benefits for Dust-Lead Hazard Standard Alone (Using the Empirical Model)*

Option (µg/ft²)		Number of Homes Exceeding Option (Millions)	Empirical Model Results (50-years; $Billion)		
Floor Dust	Sill Dust		Costs	Benefit	Net Benefit
50	100	34	19	36	17
50	250	21	12	34	22
100	250	19	10	32	22
50	500	16	9	31	22
100	500	14	8	28	21
100	1,000	11	6	25	19

*Note: Rows may not add due to rounding. This table does not include estimated costs or benefits of paint and soil interventions, or any risk assessment costs.

Table 7.—Estimated Costs, Benefits, and Net Benefits for Soil-Lead Hazard Standard Alone (Using the Empirical Model)*

Soil Option (ppm)	Number of Homes Exceeding Soil Option (Millions)	Empirical Model Results (50-years; $Billion)		
		Costs	Benefit	Net Benefit
500	11.8	42	36	-6
1,000	5.8	28	22	-6
1,200	4.7	25	19	-7
1,500	3.2	16	14	-1
2,000	2.5	9	10	2
2,500	1.5	6	5	-0.2
3,000	0.7	4	3	-1
3,500	0.7	4	3	-1
4,000	0.7	4	3	-1
4,500	0.3	1	1	1
5,000	0.2	0.4	1	0.5

*Note: Rows may not add due to rounding. This table does not include estimated costs or benefits of paint and dust interventions, or any risk assessment costs.

Net benefits for dust range from $17 billion to $22 billion. Of the six combinations of dust standard options evaluated, net benefits are relatively constant for all the combinations except the most and least stringent. For the four other options, benefits and costs increase at approximately the same rate, resulting in little change in net benefits. Net benefits for soil range from $-7 billion to $2 billion, approaching maximum levels near 5,000 ppm and 2,000 ppm. Below 2,000 ppm, net benefits decrease because total benefits increase at a slower rate than total costs. The increased number of children protected at more stringent standards is offset by a smaller predicted reduction in risk at lower environmental levels.

As stated above, the results presented in this section show the estimated costs, benefits, and net benefits associated with a range of dust standards resulting from dust interventions only and with a range of soil standards resulting from soil interventions only. These are the estimates EPA used in its decision-making process when selecting the preferred options for the proposed dust-lead and soil-lead hazard standards. These single-medium estimates enable the Agency to attribute costs, benefits, and net benefits to the interventions in a specific medium and allowed EPA to compare options when developing the media-specific standards.

The Agency, however, believes that it would be useful for the public to examine the estimates of costs, benefits, and net benefits for dust and soil interventions combined. Table 8 presents the estimates developed by the IEUBK model-based approach for a range of floor dust standards assuming a sill dust standard of 250 µg/ft² and a soil standard of 2,000 ppm. Table 9 presents the estimates developed by the IEUBK model-based approach for a range of soil standards assuming a floor dust standard of 50 µg/ft² and a sill dust standard of 250 µg/ft². Table 10 presents the estimates developed by the empirical model-based approach for a range of floor and window sill dust standards assuming a soil standard of 2,000 ppm. Table 11 presents the estimates developed by the empirical model-based approach for a range of soil standards assuming a floor dust standard of 50 µg/ft² and a sill dust standard of 250 µg/ft². The estimates presented in these tables are based on the Agency's economic analysis.

It is important to note that the costs and benefits for the combined dust and soil standards in tables 8 through 11 are less than the sum of the costs and benefits for the corresponding media-specific dust and soil standards presented in tables 4 through 7. This difference occurs because soil abatements are assumed to include dust cleaning. Therefore, the estimate of benefits derived from addressing soil hazards alone includes some benefit from dust cleaning, which is also included in the estimate of dust benefits alone. When EPA estimates the benefits for the combined dust and soil standards, dust cleaning that would be triggered by either proposed standard is only counted once. The overlapping dust benefit, however, accounts for only a small part of the overall benefit of the proposed dust standard. Many homes that exceed the proposed dust standard do not exceed the proposed soil standard; therefore, only a dust cleaning would be performed in these homes and benefits derived from establishing a dust hazard standard would not be double counted.

EPA wishes to reiterate that the estimates presented in Tables 8 through 11 are presented for informational purposes only and were not used to guide Agency decision-making for this proposal. The Agency requests comments on this alternate approach for presenting benefits, costs, and net benefits.

Table 8.—Estimated Costs, Benefits, and Net Benefits for Dust-Lead Hazard Standard Options (Using the IEUBK Model)*

(assumes a soil-lead hazard standard of 2,000 ppm)

Floor Dust Options (µg/ft²)	Number of Homes Exceeding Dust or Soil Option (Millions)	IEUBK Model Results (50 years; $Billion)		
		Costs	Benefit	Net Benefit
50	18	19	108	89
100	16	18	95	77

*Note: Rows may not add due to rounding. This table does not include estimated costs or benefits of paint interventions, or any risk assessment costs.

Table 9.—Estimated Costs, Benefits, and Net Benefits for Soil-Lead Hazard Standard Options (Using the IEUBK Model)*

(assumes dust-lead hazard standards of 50 µg/ft² for floors and 250 µg/ft² for window sills)

Soil Option (ppm)	Number of Homes Exceeding Dust or Soil Options (Millions)	IEUBK Model Results (50 years; $Billion)		
		Costs	Benefit	Net Benefit
500	22	50	193	143
1,000	19	38	150	112
1,200	19	35	142	106
1,500	18	26	124	98
2,000	18	19	108	89
2,500	18	17	95	78
3,000	18	16	86	70
3,500	18	16	86	70
4,000	18	16	86	70
4,500	17	12	75	62
5,000	17	12	73	61

*Note: Rows may not add due to rounding. This table does not include estimated costs or benefits of paint interventions, or any risk assessment costs.

Table 10.—Estimated Costs, Benefits, and Net Benefits for Dust-Lead Hazard Standard Options (Using the Empirical Model)*

(assumes a soil-lead hazard standard of 2,000 ppm)

Option (µg/ft²)		Number of Homes Exceeding Dust or Soil Options (Millions)	Empirical Model Results (50 years; $Billion)		
Floor Dust	Sill Dust		Costs	Benefit	Net Benefit
50	100	28	27	43	16

Table 10.—Estimated Costs, Benefits, and Net Benefits for Dust-Lead Hazard Standard Options (Using the Empirical Model)*—Continued

(assumes a soil-lead hazard standard of 2,000 ppm)

Option (μg/ft²)		Number of Homes Exceeding Dust or Soil Options (Millions)	Empirical Model Results (50 years; $Billion)		
Floor Dust	Sill Dust		Costs	Benefit	Net Benefit
50	250	18	19	39	19
100	250	16	18	37	19
50	500	14	17	36	19
100	500	12	15	33	18
100	1,000	10	14	30	16

*Note: Rows may not add due to rounding. This table does not include estimated costs or benefits of paint interventions, or any risk assessment costs.

Table 11.—Estimated Costs, Benefits, and Net Benefits for Soil-Lead Hazard Standard Options (Using the Empirical Model)*

(assumes dust-lead hazard standards of 50 μg/ft² for floors and 250 μg/ft² for window sills)

Soil Option (ppm)	Number of Homes Exceeding Dust or Soil Options (Millions)	Empirical Model Results (50 years; $Billion)		
		Costs	Benefit	Net Benefit
500	22	50	55	5
1,000	19	38	47	9
1,200	19	35	45	10
1,500	18	26	42	16
2,000	18	19	39	19
2,500	18	17	36	19
3,000	18	16	35	19
3,500	18	16	35	19
4,000	18	16	35	19
4,500	17	12	33	21
5,000	17	12	33	21

*Note: Rows may not add due to rounding. This table does not include estimated costs or benefits of paint interventions, or any risk assessment costs.

C. Agency Decisions for Dust and Soil Standards

This section of the preamble presents EPA's decisions regarding the dust and soil standards. These decisions are based on the interpretation of, and the conclusions drawn from, the results of the normative analysis presented in the previous section of the preamble. The interpretations and conclusions are discussed in the context of the explanations for the specific decisions made by the Agency. The public should refer back to the previous section for a more complete treatment of the analytical results.

When considering the impacts of the proposed standards for dust and soil, the public should understand that properties will be evaluated by comparing these standards to average dust and soil-lead levels measured by a risk assessor, not worst-case or maximum values. As noted in Unit VI. of this preamble, the use of the average value is the most reasonable approach in the absence of specific detailed information about exposure.

1. *Dust-lead hazard*. EPA has decided to propose 50 μg/ft² as the dust-lead hazard standard for uncarpeted floors and 250 μg/ft² for interior window sills. According to the empirical model-based analysis, the results of which are summarized in Table 6, four of six combinations of options for floor and window sill standards have net benefits in the maximum range (i.e., $21 to $22 billion). One combination (100 μg/ft² for floors, 1,000 μg/ft² for sills) provides significantly less risk reduction relative to cost; and one combination (50 μg/ft² for floors, 100 μg/ft² for sills) provides little additional benefit but costs increase significantly. Incremental benefits are less than one third the incremental costs and an additional 11 million homes would fall under the standard. EPA, therefore, considers that this lower standard for sills is associated with increased costs without commensurate attendant benefits.

Of the four combinations where net benefits are in the maximum range, the proposed option is the most protective in terms of the amount of risk reduction yielded. The other three options, though less costly, also provide less risk reduction. The decrease in both costs and benefits as the combination of floor and sill options become less stringent are roughly the same (between $5 billion and $6 billion), resulting in little change in net benefits.

EPA decided to propose the 50 μg/ft² and 250 μg/ft² standards respectively for floors and sills because the Agency prefers to select the most protective of the four combinations where net benefits are in the maximum range. Selecting the most protective combination of dust-lead hazard standards is especially important when considered in combination with the soil and paint standards being proposed or considered today. It will help protect children who are exposed to lead in soil at concentrations between the level of concern and the hazard level by mitigating exposure in one of the pathways by which children are exposed to lead in soil.

The Agency did not consider a floor standard option less than 50 μg/ft² because, in its risk analysis, EPA's best estimate is that the post intervention-dust lead loading is the lower of the pre-intervention dust-loading or 40 µg/ft². This is the Agency's best estimate of dust levels that would remain after controlling sources of lead and thoroughly cleaning the residence. It is based on an analysis of data from several abatement studies which is more fully discussed in Chapter 6 of the Agency's risk analysis. In light of this estimate, it would be impractical to set the standard for floors lower than 40 µg/ft² because little or no risk reduction is likely to be achieved for homes that had dust-lead loadings at or below 40 µg/ft². If new data become available before promulgation of the final rule that show that even lower post-intervention dust-lead loadings can be achieved, EPA would consider establishing a more stringent dust-lead hazard standard.

EPA's decision on the floor standard is further supported by the results of the IEUBK model-based normative analysis, summarized in Table 4, which show that the net benefits for the proposed floor standard are greater than those for a less stringent standard; net benefits estimated by this analysis increase from $48 billion for 100 µg/ft² to $61 billion for the proposed 50 µg/ft² standard. The IEUBK model was not used to analyze sill options because the model does not contain a sill parameter.

EPA reiterates that this normative cost-benefit analysis has been undertaken for comparative purposes only and does not mean to imply that billions of dollars will be spent on lead dust cleanup. These costs are put into better perspective when it is understood that the cost per residence of dust cleaning is less than $600 per affected residence over a 50–year period in 1995 dollars. In making this decision, EPA recognizes that the proposed standard could result in dust hazard interventions in perhaps as many as 20 million homes. Although this is a very large number of homes, the cost of intensive dust cleaning is relatively low for individual residences.

2. *Dust-lead level of concern*. As noted earlier, EPA has decided not to include a level of concern in the proposed regulations. The Agency has further decided not to include a dust-lead level of concern that is distinct from the dust-lead hazard standard in accompanying guidance. This decision is based on the fact that there is significant overlap between the results of the analysis for the level of concern and the dust-lead hazard standards. According to the performance characteristics analysis, the range for the level of concern is 50 to 400 µg/ft² for uncarpeted floors and 100 to 800 µg/ft² for interior window sills. The hazard standards of 50 µg/ft² for floors and 250 µg/ft² for sills are within these ranges. Because it would make no sense for the level of concern to be higher than the hazard standard according to the Agency's policy framework, the level of concern for floors could not be higher than 50 µg/ft², the lowest level of concern shown by the Agency's analyses. EPA's analysis therefore suggests that the dust-lead level of concern and the dust-lead hazard level for floors should be the same. In light of this result, the Agency has decided that including a dust-lead level of concern in guidance would serve no practical purpose.

For window sills, it is possible to have a level of concern as low as 100 µg/ft², which is lower than the hazard level. For several reasons, however, EPA has decided not to use this level in guidance. First, the performance characteristics analysis of the Rochester data show that there is no difference in risk between 100 µg/ft² and 250 µg/ft². Due to the high correlation between lead in dust on window sills and lead in dust on floors and a small sample size, risk does not change as sill dust-lead levels vary when accounting for floor dust-lead levels (Ref. 64). Second, there is a high degree of variability in dust-lead loading measurements, varying from day-to-day and from location-to-location on the same surface. In light of the small difference in risk and the high degree of variability in measuring dust levels, having a level of concern for window sills in accompanying guidance would introduce unnecessary complexity into EPA's program.

3. *Soil-lead level of concern*. EPA is proposing not to include a soil-lead level of concern in the regulation. The Agency, instead, is requesting comment on including 400 ppm as the soil-lead level of concern. As discussed above, the IEUBK model indicates that soil-lead concentrations associated with the risk level of concern are generally at or below 500 ppm and the performance characteristics analysis yielded a range of 200 ppm to 1,500 ppm. Thus, the range of soil-lead levels from 200 ppm to 500 ppm is supported by the results of both analyses. Lacking technical criteria to select one level from this range as the proposed soil-lead level of concern in accompanying guidance, the Agency determined that it should choose 400 ppm because it is both within this range and consistent with the soil screening level used by EPA's Superfund and RCRA corrective action programs (Ref. 84) and EPA's current guidance on lead-based paint hazards (60 FR 47248). It is clear from all the evidence that this level ''poses a threat of adverse health effects.'' The analysis, above, shows there is a one to five percent chance that individual children exposed to this soil level could have a blood-lead level equal to or exceeding 10 µg/dl, although the Agency could not say that adverse health effects ''would result'' from these levels.

4. *Soil-lead hazard*. As explained in Unit II. of this preamble, this public health decision requires consideration of the potential risks to children that may occur at levels equal to or lower than the chosen hazard level. At the same time, EPA believes that consideration of costs is necessary to ensure that the hazard standard promotes priority-setting and supports the establishment of a workable national hazard evaluation and control program. To arrive at a proposed soil-lead hazard level, EPA sought a level at which the Agency had sufficient confidence in the likelihood of harm (i.e., greater than the level of concern) and that the cost of abatement seemed warranted to achieve the associated level of risk reduction.

Based on the Agency's analysis and judgment, EPA has decided to propose 2,000 ppm as the soil-lead hazard standard. This decision is based on the following reasons. First, the results of the empirical model-based normative analysis (summarized in Table 7) show that net benefits are positive and near the maximum level at 2,000 ppm. The IEUBK normative model-based analysis (summarized in Table 4b) shows positive and significantly higher net benefits at concentrations up to 2,000 ppm than for soil-lead concentrations above 2,000 ppm. Positive net benefits indicate that the cost of soil abatement at this concentration is less than the benefits associated with risk reduction for the population as a whole. Because both analyses show positive net benefits at 2,000 ppm, EPA is confident that this level represents a reasonable public health policy choice for today's proposal.

As stated previously, EPA conducted the normative cost-benefit analysis for purposes of comparing options. Undue emphasis should not be placed on the total costs and benefits estimated by each analysis. It is probably more useful, therefore, to consider what the Agency's analysis and decision implies for the average property. According to EPA's analysis, the average cost of soil abatement for a residence at 2,000 ppm is about $3,600. The analyses show that cost is commensurate with risk reduction at this concentration because the value of risk reduction in terms of avoided adverse health effects is greater than the cost. It is important to recognize, however, that the benefits account not only for the child immediately protected when the abatement is performed but also for children who may reside in that residence in the future. The comparison of estimated costs and benefits for an individual property is also an average. For some homes, costs could be higher than benefits. EPA's decision, however, is based on the overall benefit to society which accounts for benefits for future generations of children and for the average child.

Second, outside of its use in the economics model, the IEUBK model predicts significant risk to children at this soil-lead concentration under virtually all exposure scenarios. At 2,000 ppm in soil, the model estimates a mean blood lead level in the range of 11-16 μg/dl, depending upon the assumed concentration of lead in house dust (100-1,400 ppm in this case). This range corresponds to approximately 55 to 80 percent equal to or exceeding 10 μg/dl and 9 to 30 percent exceeding 20 μg/dl.

Third, data from a number of epidemiological studies show that between 40 and 50 percent of the children living in certain communities with soil-lead concentrations at the 2,000 ppm level have blood-lead concentrations equal to or exceeding 10 μg/dl and that 10 percent of children have blood-lead concentrations equal to or exceeding 20 μg/dl (Ref. 85).

In reaching its decision, EPA rejected more stringent options for several reasons. First, although the IEUBK model-based analysis shows higher net benefits for more stringent standards, the results of the IEUBK model-based analysis at relatively low soil-lead concentrations (e.g., 500 ppm) are very sensitive to assumptions in both the analysis and the model. As noted above, a significant proportion of these benefits are associated with changes in dust concentration which are affected by both the HUD National Survey data and EPA's assumptions about post-intervention dust concentrations. The results are also very sensitive to the assumed relationship between soil-lead and blood-lead concentrations in the IEUBK model. Because of the larger number of homes at lower soil-lead concentrations (e.g., 11.8 million ≤ 500 ppm versus 2.5 million ≤ 2,000 ppm) and the smaller reductions in environmental lead levels that can be achieved at the lower concentrations, a slight change in the relationship between soil-lead and blood-lead concentrations can produce significantly different net benefits. Consequently, it is questionable whether risk reduction would be commensurate with costs and lower soil-lead concentrations.

Second, the Agency's analysis did not consider the role that interim controls can play in reducing risks at lower soil-lead concentrations. Interim controls were not considered because EPA lacks data to estimate the effectiveness of these controls. The Agency believes that at lower soil-lead concentrations, interim measures can interfere with exposure pathways and reduce risk and that these measures may be more cost effective than abatement at lower concentrations.

Third, EPA is concerned that more stringent standards would not meet the priority-setting goals the Agency believes are appropriate for the Title X program. Based on the soil-lead data in the HUD National Survey, EPA estimates that 4.7 million homes would exceed 1,200 ppm and nearly 12 million homes would exceed 500 ppm, two options considered by the Agency. Scarce resources potentially would have to be allocated across more communities and would be diverted away from interventions needed to respond to both deteriorated interior and exterior lead-based paint. The proposed 2,000 ppm standard will help focus resources for soil abatement on significantly fewer properties (i.e., 2.5 million).

In proposing 2,000 ppm as the soil-lead hazard standard, EPA does not wish to communicate a lack of concern about risks that exists below this soil-lead concentration. In fact, the Agency recognizes that there could be substantial risk below 2,000 ppm. The IEUBK model predicts risk to children under a variety of exposure scenarios. At 1,200 ppm in soil, the model estimates a mean blood lead level in the range of 8 to 11 μg/dl, depending upon the assumed concentration of lead in house dust (100 to 850 ppm in this case). This range of mean blood-lead concentrations corresponds to a range of approximately 30 to 60 percent exceeding 10 μg/dl and 2 to 10 percent exceeding 20 μg/dl. As noted above, however, the Agency believes that it is not appropriate to set a more stringent uniform national soil-lead hazard standard because costs may not be commensurate with risk reduction and resources would not be adequately focused. The Agency further thinks that measures undertaken in response to the proposed soil-lead level of concern in the accompanying guidance and dust hazard standards will help protect children exposed to soil-lead concentrations between 400 ppm and 2,000 ppm. It should be noted that abatement at levels below 2,000 ppm may be appropriate on a case-by-case basis depending on local conditions.

EPA also considered a less stringent standard of 5,000 ppm. This option has several advantages. First, consistent with the priority-setting concept of Title X and the need to apply scarce resources effectively, as noted in Unit IV.A.2.b, this option would focus on properties that present the greatest risk to young children. Second, it would affect relatively few homes (i.e., an estimated 200,000 units based on data from the HUD National Survey). Because fewer homes would be affected, the estimated cost associated with this option, as shown in Tables 5 and 7, is significantly lower than the cost of the preferred option ($0.4 billion for 5,000 ppm vs. $9 billion for 2,000 ppm), thus reducing the impact of the rule on properties and communities. In fact, according to the empirical model-based approach, the net benefits are about the same for 5,000 ppm and 2,000 ppm. Third, this level would be consistent with EPA's interim guidance document on lead-based paint hazards (60 FR 47248). Some argue that the adoption of a more stringent soil hazard standard — given the substantial costs of soil abatement — may influence the decisions or actions of owners of target housing in unintended ways. The Agency is interested in receiving comments on how the hazard standard may influence owners, the number of clean-ups or interventions, and whether the hazard standard would influence housing availability. In discussions at EPA's dialogue process, many interested parties stated that the guidance was a workable approach that should be adopted in the regulation.

This option, however, is characterized by several important disadvantages. First, the IEUBK model predicts, and the epidemiological data show, that a substantial number of children who are exposed to soil with lead levels between 2,000 ppm and 5,000 ppm have moderately to highly elevated blood lead levels. Furthermore, interim controls would be relied upon to address risks from soil-lead concentrations up to 5,000 ppm under this option. It is important to consider that interim controls, which may successfully mitigate risks at lower soil lead concentrations, do not eliminate the lead source. Rather, they serve to reduce exposure by limiting the accessibility of the soil and the consequent inadvertent ingestion or tracking of the soil into a home (where it can contribute lead to interior dust). As the soil lead concentration increases, however, it is more likely that even if accessibility of the soil were reduced, significant risk would remain. In the case of track-in, the Agency is concerned that even a relatively small amount of high-lead-concentration soil can re-contaminate interior dust and reintroduce a dust-lead hazard. Second, although, as stated above, costs may be lower at 5,000 ppm, the IEUBK model-based approach shows that net benefits also decrease by $32 billion when increasing the standard from 2,000 ppm to 5,000 ppm. Furthermore, the empirical model-based approach shows that, while net benefits are about the same for both options, benefits decline by $9 billion when the standard increases from 2,000 ppm to 5,000 ppm.

In light of the results of EPA's formal cost-benefit analysis, the risk predictions of the IEUBK model, and the risk to young children documented by the epidemiological data, EPA decided that 2,000 ppm was a more appropriate option for today's proposal. In reaching this decision, EPA was mindful of the impacts that the costs of soil abatement could have on individual properties and communities. Consideration of costs and their impacts was the primary reason why EPA selected 2,000 ppm rather than a more stringent option (e.g., 1,200 ppm). Moreover, EPA would have selected 2,000 ppm as its preferred option even if the Agency had relied only on the empirical model and epidemiological data as some stakeholders have suggested. The results of the empirical model-based analysis show that both the 2,000 ppm option and the 5,000 ppm option are equivalent in terms of net benefits. The benefits at 2,000 ppm, however, are substantially higher because, as the epidemiological data shows, there is substantial risk to children exposed to lead in soil at concentrations between 2,000 ppm and 5,000 ppm.

EPA notes that it does not anticipate that setting the soil-lead hazard standard at 2,000 ppm would adversely impact individuals who previously relied voluntarily on the guidance. First, EPA has no information to suggest that many property owners have performed soil abatements. Second, it is very likely that properties where soil abatements were performed would now have soil-lead concentrations well below 2,000 ppm and even below 400 ppm, the soil-lead level of concern. This conclusion is based on the fact that when soil is removed, it is replaced by ''clean'' soil--soil that has a very low lead concentration.

D. Hazardous Lead-Based Paint

This section of the preamble presents EPA's proposed standard for deteriorated lead-based paint. It also presents options for addressing lead-based paint on friction and impact surfaces and lead-based paint on surfaces accessible for chewing and mouthing by young children. The Agency, however, is not proposing standards for lead-based paint on friction, impact, and accessible surfaces, but is, instead, asking for public comments on the options presented below.

For any type of hazardous lead-based paint, the paint must be lead-based according to the statutory definition (i.e., $\geq$1 mg/cm^2 or 0.5 percent by weight). Determination of whether the paint is lead-based is made by a certified inspector or risk assessor based on testing results. EPA is developing a separate guidance document that will address paint sampling.

1. *Deteriorated lead-based paint.* To meet the statutory requirement to identify hazardous lead-based paint, EPA must determine those conditions of deteriorated lead-based paint which would result in adverse human health effects.

Exposure to deteriorated lead-based paint can result in adverse human health effects, based on the fact that children can be exposed to lead through several pathways when lead-based paint is deteriorated and that studies document an association between children's blood-lead concentrations and the presence of deteriorated lead-based paint. EPA, however, is unaware of any data that would allow the Agency to more specifically relate conditions of deterioration (e.g., levels of lead in paint, minimum area of deteriorated lead-based paint) to blood-lead concentration. The Agency, therefore, has chosen to propose a standard for deteriorated paint using the criteria for paint condition in Table 5.3 of the HUD Guidelines (Ref. 11) for the reasons discussed below.

Exposure to lead from deteriorated lead-based paint can occur in three ways. First, children who exhibit pica, a hunger for substances not fit for food, may eat paint chips (Ref. 86). Second, deteriorated interior lead-based paint can contaminate household dust which may be inadvertently ingested by children through normal hand-to-mouth behavior. Third, deteriorated exterior lead-based paint can contaminate residential soil which can also be inadvertently ingested by children. Soil, in turn, can be tracked into a residence, contaminating the household dust.

These three scenarios have been demonstrated in various studies that used stable isotopes of lead as tracers (see, e.g., Refs. 87 and 89). Basically, this technique relies upon the fact that the isotope ratios of lead ores vary by deposit. Consequently, lead-containing products, such as lead-based paints and leaded gasolines, can have unique ratios of the stable isotopes in the lead. Comparison of the isotope ratios in these products to those of environmental media and blood can in some cases identify categories of products as the source of lead in the environmental media and/or lead in the blood.

Rabinowitz (1987) reports use of this technique to investigate the specific sources and pathways of lead exposure in three cases of chronic, high-level lead poisoning (blood-lead concentrations of 120, 83, and 66 µg/dl) (Ref. 90). In each case, blood, feces, and the child's home environment (paint, dust, and soil) were sampled and analyzed. All of the children had deteriorated paint present in their homes. Additionally, a series of environmental samples were collected and analyzed to characterize background lead throughout the city.

In the first two cases, the isotopic composition of the blood (indicative of chronic exposure) and the feces (indicative of exposure during the preceding day) were nearly identical. In the first case, they resembled the paint sample from the child's bedroom wall (which was similar to the exterior soil). In the second case, they closely matched the lead in window sill paint, but not the kitchen wall or garden soil. In the third case, the blood lead was close to that of the paint in the child's bedroom, which was believed to be the source of his chronic exposure, whereas the fecal lead appeared to be similar to fallout from current automobile emissions in the area. While such data do present some ambiguities, they are consistent with paint being the proximate or remote source of the child's lead exposure and the author's conclusion that, in cases of severe lead poisoning, the lead in the child's blood and feces closely resembles lead in paint on an accessible surface. Additionally, based upon isotopic comparisons between household dust and urban soils, the study also concluded that: (1) In the absence of lead-based paint, the leads in urban soils and household dust have nearly the same isotopic composition, and (2) lead-based paint, when present, can be responsible for 20 to 70 percent of lead in household dust and much of the lead in yard soil.

Yaffe, et al. presented two cases which also included measurement of the isotopic ratios of lead in blood, paint, dust, and soil (Ref. 89) . In both cases, it was unlikely that direct ingestion of paint chips was the cause of the elevated blood-lead concentrations. This was based on the facts that: (1) There was no indication that the children were pica-prone based upon interviews with the children and their parents, and (2) higher than exhibited blood-lead concentrations would be expected if paint chips were being ingested, given the very high lead levels in the paint.

The first case involved 10 children with blood-lead concentrations from 28 to 43 μg/dl. The isotopic ratios of the children's blood lead were similar, suggesting a common set of lead exposures. These ratios were quite similar to those of soil samples collected around the house and interior dust samples. The close agreement between the average isotopic ratios of exterior paint samples and the soils near the house suggested that the soil was contaminated by the exterior paint, which was badly deteriorated.

The second case involved twin 2–year old males with blood-lead concentrations of 37 and 43 μg/dl. The isotopic ratios of the twins' blood lead were similar to the soil in their side yard and in the back yard of a nearby house where they often played. These soils had similar ratios to adjacent exterior walls. This suggests that the lead in the soils was primarily derived from the weathering of nearby painted surfaces and that the contaminated soil was a significant source of the twins' exposure. The interior dust sample lead was not similar to the exterior soil or the twins' blood lead. Such cases, where soil or dust becomes contaminated by deteriorating paint, demonstrate the need for a paint standard as well as soil and dust standards. Lacking a paint standard, the paint can continue to re-contaminate soil and dust, rendering abatement and control measures directed at those two media ineffective.

The scientific literature also includes several studies that have identified a statistically significant relationship between deteriorated paint and children's blood-lead concentrations. One study suggests that infant blood-lead concentrations are a function of paint deterioration and lack of maintenance of the residence (Ref. 91). In this study, housing was classified as deteriorated if the exterior was not well maintained or had peeling paint, as observed from the street. For infants at 12 to 18 months old, geometric mean blood-lead concentrations were twice as high in deteriorated housing (33 μg/dl) than in housing graded as satisfactory (15 μg/dl).

Another study identified statistically significant correlations between the presence of both deteriorated interior and exterior lead-based paint and children's blood-lead concentrations (Ref. 92). Presence of peeling exterior paint was among the most influential factors explaining the blood-lead concentrations of 2-year olds. It should be noted, however, that lead levels in paint were not reported in the paper. Therefore, it is not certain that the results of this study actually represent deteriorated lead-based paint.

Analysis of data from the Rochester Lead-in-Dust Study performed to support this rule's comprehensive risk analysis also shows a relationship between deteriorated lead-based paint and children's blood-lead concentrations. The empirical model, which explicitly incorporated pica behavior, yielded a significant positive relationship between deteriorated paint and children's blood-lead concentrations (Ref. 1).

Analysis of the HUD National Survey data suggests that deteriorated lead-based paint is indirectly linked to elevated blood-lead concentrations in young children through lead in household dust and residential soil (Refs. 8-9, and 19). Of those homes with interior lead-based paint, 34 percent with non-intact paint had elevated dust lead levels (i.e., elevated in comparison to HUD's dust clearance levels at the time the survey was conducted) compared to 18 percent of homes with intact paint. Of those homes with exterior lead-based paint, 53 percent of homes with non-intact paint had elevated dust lead levels compared to 12 percent with intact paint. Although correlation analysis cannot be used to prove causation, EPA believes that it is reasonable to conclude that the lead in the deteriorating paint is a significant source of the lead in the dust and soil.

Based on its analysis of existing studies and data, EPA believes that deteriorated paint is a significant source of lead exposure for young children through direct ingestion and through contamination of dust and soil. To promote priority setting and the establishment of a workable program, EPA thinks that the standard for deteriorated lead-based paint should exclude small amounts of deterioration. From a common sense perspective, it seems that there should be lower exposure and risk from lead-based paint where there are lesser amounts of deteriorated lead-based paint. There would be fewer paint chips to contribute lead to dust and fewer paint chips available for direct ingestion.

Because there are no data to directly relate the degree of deterioration to blood-lead, EPA was unable to perform an analysis to specify a minimal area of deterioration that would be considered a hazard. The Agency therefore has decided to propose the conditions of deterioration used currently in the 1995 HUD Guidelines. The HUD Guidelines define lead-based paint in poor condition as more than 2 square feet of deteriorated lead-based paint on any large interior architectural component (e.g., floors, walls, ceilings, doors, etc.), more than 10 square feet of deteriorated lead-based paint on any large exterior architectural component (e.g., siding), or deteriorated lead-based paint on more than 10 percent of the surface area of any small architectural component constitutes hazardous lead-based paint.

The Agency decided to use the criteria in the HUD Guidelines for two reasons. First, these criteria are becoming the *de facto* industry standard. They are being considered for incorporation into model housing and building codes and by State officials for adoption as State standards. Second, EPA decided that relatively small thresholds are needed to be protective, because the area of deterioration has the potential to increase over time and because the presence of even small amounts of deterioration can present a significant risk to children who exhibit pica for paint. The Agency wishes to emphasize that while areas of deteriorated paint that fall below the threshold would not be considered a hazard, property owners should try to keep paint intact, especially paint known to be lead-based, because of the risk to some children.

EPA cannot quantify the cost savings of including a minimum area of deteriorated lead-based paint. The Agency presumes, however, based on the available data, the minimum area threshold would reduce the number of paint interventions that may be undertaken while still providing protection to populations of concern. For example, according to the HUD National Survey, of the estimated 15 million homes currently in the housing stock that have deteriorated lead-based paint, 11 percent have less than 5 square feet of deteriorated paint and 36 percent have less than 10 square feet of deterioration (Ref. 93). With a *de minimis* level in place, millions of homes would not be identified as having hazardous deteriorated paint. It is important to note, however, that the presentation of these data is only intended to provide a frame of reference. They are not comparable to the criteria in the HUD Guidelines because these criteria are component-based and the data in the HUD National Survey apply to the aggregate area of deteriorated paint in the entire residence.

EPA considered two other options for identifying the conditions where deteriorated lead-based paint would be defined as a hazard. One alternative involved combining surface area with the levels of lead in paint. This approach is based on the assumption that the hazard presented by an area of highly concentrated deteriorated lead-based paint is greater than the hazard presented by an equal area of deteriorated paint with a lower concentration of lead. Although this assumption is technically appealing, EPA has no basis for establishing the appropriate combinations of area and lead loadings. Furthermore, the Agency believes that this approach would be overly complex and costly to implement because it would require significantly more paint testing.

The second alternative involved measuring the aggregate amount of deteriorated lead-based paint at an entire residence, as was measured in the HUD National Survey, rather than on individual architectural components, as is provided for in the HUD Guidelines. The advantage of this approach would be that the aggregate amount of deteriorated lead-based paint at an entire residence may be a better indicator of risk than the amount of deteriorated paint on individual components. EPA, however, has no data to support this assumption or to select a minimum area. In addition, this approach may be more expensive to implement because it could require the risk assessor to test all deteriorated paint on all individual components to determine whether the aggregate area of deteriorated lead-based paint exceeds the threshold. In contrast, the component-based approach would be less expensive because it would require the risk assessor to test deteriorated paint on only those components where the deterioration exceeds the area threshold. Furthermore, the component-based approach is consistent with paint abatement activities, which addresses hazards on individual components.

In light of the uncertainty associated with EPA's decision, the Agency is seeking comment on several issues related to the deteriorated lead-based paint hazard standard. First, EPA is interested in any data the public may have that would enable the Agency to better characterize the relationship between the amount of deteriorated lead-based paint and health risk. Second, EPA requests comments on the surface area hazard thresholds included in the proposed standard. Third, the Agency is seeking comment on whether the proposed component-based area threshold is better than an aggregate residence-based threshold.

2. *Friction and impact surfaces.* Title IV of TSCA specifically identifies lead-based paint on friction and impact surfaces as a potential type of hazardous lead-based paint because the repeated rubbing and impacts may generate fine particles of lead-containing paint that can contaminate household dust. TSCA section 401 defines friction surfaces as surfaces that are subject to abrasion or friction including certain window, floor, and stair surfaces. Impact surfaces are surfaces subject to damage by repeated impacts such as certain parts of a door frame.

The data linking lead-based paint on friction and impact surfaces with lead in dust, however, are limited and inconclusive. Analysis of the HUD grantee data shows that there are many instances where lead-based paint on friction and impact surfaces and low dust-lead levels may be found in the same residence (Ref. 94). These data were collected from homes undergoing hazard evaluation and control under lead hazard control grants awarded by HUD under authority of section 1011 of Title X. In fact, of the windows with lead-based paint in good condition, 65 percent had dust-lead levels below the HUD clearance level. These data suggest, contrary to the conventional wisdom, that lead-based paint on friction and impact surfaces does not necessarily result in elevated levels of lead in household dust. Even if elevated levels of lead in dust are identified, it is not clear that lead-based paint on friction and impact surfaces is the source of the lead. In light of the uncertainties and contradictory evidence, EPA considered several alternatives for addressing these surfaces.

When reviewing these alternatives, the public should be mindful that the options for lead-based paint on friction and impact surfaces are designed to address exposure through ingestion of dust contaminated with lead. Lead-based paint is always a hazard when it is in poor condition, regardless of its location in a residence. The paint in poor condition critierion is designed to address exposure through direct ingestion of paint chips.

Option 1. Under this alternative, EPA considered identifying any lead-based paint on a friction or impact surfaces as a lead-based paint hazard. The Agency considered this option because it is the approach taken in EPA's July 1994 guidance. The major advantage of this option is that it is designed to address a source of dust contamination.

On the other hand, the data show that surfaces that have lead-based paint in good condition do not necessarily generate elevated levels of lead in dust (Ref. 94). This option is also inconsistent with several of the statutory precepts (i.e., priority-setting, establishing a workable framework) because it would result in widespread paint testing and/or costly responses even where dust-lead hazards are not present.

Option 2. Under the second option, EPA considered identifying abraded lead-based paint on friction and impact surfaces as hazardous lead-based paint. The point of this option is that it identifies a condition, abrasion, associated with the generation of leaded dust, thus overcoming the chief deficiency of the first option. It shares the advantage of option one in that it is designed to address a source of dust contamination.

On the other hand, this option is characterized by several disadvantages. It would identify friction or impact surfaces as a hazard regardless of the dust-lead levels present in the residence. Without a dust-lead hazard, there appears to be no pathway of exposure. Even if a dust-lead hazard is present, there is no certainty that the friction and impact surfaces are the source of the lead. As with option one, this option would result in paint testing and/or costly responses in many older homes because of the high prevalence of abraded paint, even if there is no evidence that these surfaces are contributing to elevated levels of lead in dust.

Option 3. Under the third option, EPA would not identify lead-based paint on friction and impact surface as hazardous lead-based paint. A risk assessor should evaluate the levels of lead in dust and determine whether a dust-lead hazard is present in the residence. If so, the property owner or other decision-maker has the option to clean dust, which may provide only short-term control of the hazard, or to address the sources of lead in the dust, including friction and impact surfaces, which would provide long-term control. The purpose of this option is to address the immediate exposure source for children, which is lead in the dust, and to provide flexibility to property owners regarding how to control hazards.

This option has several disadvantages. First, this option is not designed to address the source of lead but rather the exposure pathway. A second disadvantage is that this option depends on dust-lead measurements, which are highly variable, to determine whether there is a problem. If a risk assessor obtains an atypically low dust measurement, he/she might not identify friction and impact surfaces as a potential source of contamination. Third, it fails to address directly a component that was specifically identified in the statute.

For today's proposal, EPA has decided not to include a standard for friction and impact surfaces. None of the three options is clearly preferable. The first two options are designed to address sources of lead. The primary pathway of exposure, however, is lead dust, and, it makes little sense to burden a system with potential replacement of components if there is no serious dust exposure.

The third option overcomes these disadvantages, providing an incremental and flexible approach that indicates response actions where there is an exposure pathway (i.e., presence of dust) and allows decision-makers to choose the most cost-effective response (i.e, repeated dust cleaning or component replacement). On the other hand, this option fails to set a separate standard for surfaces of concern that were specifically identified in the statute. Because this option relies exclusively on dust loading measurements, which are highly variable, it may fail to identify sources of hazards and may not be adequately protective.

In light of the concern about friction and impact surfaces and the uncertainties and contradictory data, EPA requests comment on the three options presented above. EPA would also be interested in other approaches for addressing lead-based paint on friction and impact surfaces.

3. *Surfaces accessible for chewing or mouthing.* TSCA section 403 also requires EPA to identify the conditions under which exposure to intact lead-based paint on surfaces accessible for chewing or mouthing by young children would result in adverse human health effects. Chewing on surfaces covered by lead-based paint can result in the ingestion of a relatively large amount of lead, leading to an acutely high exposure. Unlike pica, which is not considered normal behavior and occurs in a relatively small percentage of the population, the chewing or mouthing of hard surfaces is a normal part of a child's teething process.

The available data with respect to prevalence of mouthing or chewing of accessible surfaces are mixed. Radiological examinations of the children with high blood-lead concentrations (mean blood-lead concentration was 56 µg/dl) showed that 13 of 90 children (14 percent) had evidence of paint chip ingestion (Ref. 95). The study notes, however, that the transit time of ingested material through a child's digestive system ranges from several hours to several days. Because the half-life of lead in blood is 30 days, radiographs will reveal only a small percentage of children who have elevated blood-lead concentrations due to the ingestion of a single paint chip.

On the other hand, data from HUD's lead hazard control grant recipients show that the prevalence of chewing accessible surfaces is extremely low. In the nearly 1,900 homes assessed, evidence of chewing on accessible surfaces was found in 21 residences (1.1 percent). The number of homes with accessible surfaces, however, was not determined. Window sills were the most frequently chewed component. The data show, however, that tooth marks were found on window sills in only 18 residences (one percent) (Ref. 96).

In developing today's proposal, EPA considered several options for addressing intact lead-based paint on accessible surfaces.

Option 1. Under the first option, EPA considered identifying characteristics of a component's accessibility. These characteristics would include the dimensions of a component as well as its orientation (e.g., horizontal components such as sills, vertical components such as rail spindles) and location (e.g., height of component). This approach would limit the number of surfaces which might be considered hazards to those which could potentially be chewed or mouthed. This approach, however, would significantly change the scope of risk assessments as currently defined at 40 CFR 745.227(d). In addition, the Agency lacks data to support the choice of specific criteria. Therefore, the Agency does not consider this an appropriate option.

Option 2. Under the second option, EPA considered not adopting a separate standard for surfaces accessible for chewing or mouthing. Hazardous lead-based paint would exist only if lead-based paint on the component were determined to be in poor condition. This approach would avoid requiring property owners to expend resources to address accessible surfaces when, in the vast majority of situations, these surfaces are not likely to be chewed or mouthed. This approach, however, would do nothing to address the infrequent, but often serious problem of children chewing or mouthing accessible surfaces, unless and until that actively resulted in significant deterioration of the surface.

Option 3. Under the third option, EPA would identify lead-based paint on accessible interior window sills because these are the surfaces most likely to be chewed according to the available data. EPA would propose to define accessible interior window sills as interior window sills that are no higher than 5 feet from the floor, a height that can be reached by a child when standing on the floor or on a chair or sofa. By targeting these surfaces, hazard intervention (e.g., covering or replacing the component) would be more cost-effective than an approach that identified lead-based paint on any accessible surface as a hazard. This option also has the advantage of being easy to implement, because specific surfaces (e.g., window sills) are easy to identify. On the other hand, it would result in interventions where, in the vast majority of cases, children do not need to be protected.

EPA's decision requires the Agency to balance an event (i.e., chewing of interior window sills) that has a low probability of occurring with the high probability of serious harm when the event does occur. By not establishing a hazard standard for accessible surfaces, option two gives greater weight to the event's low probability. In contrast, option three is more focused on the adverse outcome associated with chewing of paint on these surfaces. Because neither of these two options is clearly preferable, EPA is not selecting a preferred option for today's proposal. Instead the Agency is seeking comment on options two and three. In particular, the Agency would be interested in input on three issues: (1) How to balance the low probability of chewing with the high probability of serious harm if chewing occurs; (2) low cost alternatives to sill replacement (e.g., paint removal); and (3) the effectiveness of guidance to property owners to temporarily cover sills when a child who demonstrates a propensity to chew resides in the unit. EPA also invites the public to submit data on the prevalence of chewing on accessible surfaces.

V. Other Issues Affecting Standards Development and Selection

During the regulatory development process, EPA encountered a range of issues that affect the scope and structure of today's proposal and the implementation of the standards.

A. Applicability of the Standards

Two factors affect the applicability of the proposed standards for lead-based paint hazards: the statutory language and the scope of the Agency's supporting analyses. With respect to the statutory language, the term ''lead-based paint hazards'' refers to target housing in most sections of Title X and TSCA

Title IV. TSCA section 402 also uses the term in reference to public and commercial buildings and structures (e.g, water towers, bridges). The statutory definitions of lead-contaminated dust and soil, however, refer only to residential property, showing that the applicability of the dust and soil standards differs from the applicability of the paint standards. The Agency's analyses are based on data for residential exposure, thereby raising questions regarding whether the standards being proposed today would be appropriate for non-residential environments. This section of the preamble explores the applicability issue and the Agency's decision, first, with respect to the paint component of the standards and second, with respect to the dust and soil standards.

1. *Paint*. The definitions in TSCA section 401 do not explicitly identify the applicability of hazardous lead-based paint. The definition of lead-based paint hazard refers to deteriorated lead-based paint and lead-based paint on friction, impact, and accessible surfaces. The reference to deteriorated lead-based paint does not identify specific types of properties, nor do the definitions of friction, impact, and chewable surfaces. As noted above, however, the term ''lead-based paint hazard'' is used in context of target housing. The definition of deleading in TSCA refers to lead-based paint and lead-based paint hazards and, in doing so, extends the scope of lead-based paint hazards to non-residential properties as well. The statutory language, therefore, shows that the paint standard should be applicable to target housing, public and commercial buildings, and structures.

EPA, however, has no data on children's exposure to lead in paint in non-residential environments. The Agency, therefore, believes that the paint standards being proposed today should apply to target housing. The Agency has also decided to propose that the paint standards apply to child-occupied facilities. Although EPA lacks data on exposure in child-occupied facilities, the Agency believes that children face potentially equivalent risks from lead-based paint hazards in schools and day-care centers as they do at home. EPA based its decision to apply the same training, certification and work practice standards to both target housing and child-occupied facilities in the final TSCA section 402 regulation on the same argument.

In the absence of environmental and exposure data for other types of properties, the Agency has decided not to propose paint standards that are applicable to other types of public buildings, commercial buildings, and structures at this time. EPA believes, however, that this limitation should not have any meaningful impact on the regulation and its ability to protect human health. Lead-based paint encompasses lead-based paint hazards and lead-based paint is defined. Because the applicability of the proposed standard for hazardous lead-based paint is more limited than that required in the statutory language, the Agency is specifically requesting comment on this decision.

2. *Dust and soil*. In contrast to paint, the statutory language is more limited in defining the applicability of the dust and soil standards. In TSCA section 401, the statute specifically identifies lead-contaminated dust and soil in terms of ''dust in residential dwellings'' and ''bare soil on residential real property.'' TSCA section 403 states that EPA should identify lead-based paint hazards for purposes of Title X and TSCA Title IV which focus on a specific subset of residential property, namely target housing which includes most pre-1978 housing. The statutory language shows that the dust and soil standards should apply to target housing.

EPA has decided, however, to interpret residential more broadly and to propose that the dust and soil standards should apply to child-occupied facilities as well as to target housing. This decision is based on the same rationale for applying the paint standards to child-occupied facilities. As argued in the preamble to the final TSCA section 402 regulation, the Agency believes that children face potentially equivalent risks from lead-based paint hazards in schools and day-care centers as they do at home. In fact, some children spend more time in a particular classroom, day-care room, or outdoor ''play area'' then they might spend in a single room or yard at home.

Failure to apply the dust and soil standards to child-occupied facilities would leave a significant gap in the work practice standards for risk assessments and abatements at child-occupied facilities. Without dust and soil standards for child-occupied facilities, risk assessors would not be able to determine whether dust-lead and soil-lead hazards are present at these facilities. Because abatements are defined as actions designed to permanently eliminate lead-based paint hazards, owners of these facilities would be unable to determine what activities constitute abatement and when certified firms and individuals are required to perform these activities.

In light of EPA's decision to propose applying the dust and soil standards more broadly than a literal reading of the statute would suggest, the Agency is seeking comment on this aspect of the regulation. Specifically, EPA would be interested in any disadvantages associated with this decision and in alternative approaches that would provide as much protection to children.

3. *Child-occupied facilities*. Because child-occupied facilities are often located within larger facilities where children would have limited or no access, the applicability of the hazard standards to these facilities requires further explanation. The definition of child-occupied facilities found at 40 CFR 745.227 helps clarify the applicability of the hazard standards to child-occupied facilities. First, a child-occupied facility must have been constructed prior to 1978. Second, a child-occupied facility is a building or portion of a building visited regularly by children age 6 and under. The definition provides several examples including day care centers, pre-schools, and kindergarten classrooms. By limiting the meaning of a child-occupied facility to the portion of a building where a child regularly visits, the definition limits the applicability of the paint, dust, and soil-lead hazard standards to the same portion of a building. For example, the soil standard would apply only to that portion of the area outside the building designated for use by children age 6 and under.

Several examples may help illustrate how the hazard standards apply to child-occupied facilities. The first example is a day care center at a manufacturing facility. There is a separate entrance to the center and a fenced playground area adjoining the center. In this case, the center (interior rooms and outside area making up the center), not the entire plant is the child-occupied facility. Paint and dust samples would be taken from the rooms in the day care center, and soil samples would be taken from within the fenced playground. Hazard interventions should be limited to those areas. The second example is a stand-alone pre-school (i.e., the pre-school occupies the entire structure). In this case, the standards would apply to the entire property. The third example is a kindergarten at a public or private school which has a yard for recess designated for use by children age 6 and under. In this case, the paint and dust standards would apply to the kindergarten classrooms and the soil standard would apply to the school yard designated for use by the kindergarten children (i.e., except for the portions of the property such as the front lawn of the school that are not designated for use by children age 6 and under). As a final example, a day care center is located within a public or private high school. The school has several outside recreational areas, none of which are designated for regular use by children who attend the day care center. The day care consists of a class room, which is now divided into two main rooms. In this scenario, the hazard standards only apply to the interior area because the outside areas would not be defined as part of the child-occupied facility.

B. Dust Issues

1. *Loading vs. concentration*. Title X provides the legal basis for selecting the levels of lead that constitute dust-lead hazards. The statute, however, does not stipulate the measurement basis for the dust standards. Two different measures are commonly used to characterize the lead level in dust: loading and concentration. Lead concentration (or mass concentration) is a measure of how much lead is present in a given amount of dust and can be expressed in either micrograms of lead per gram of dust (µg/g) or, equivalently, in parts per million (ppm) by weight. Lead loading or area concentration, a measure of how much lead is present on a surface of given area, is expressed in mass of lead per area of surface sampled (typically, $\mu g/ft^2$ or $\mu g/m^2$).

The two measures also differ in the way environmental sampling is conducted. Dust-lead loading data can be obtained through either wipe sampling or vacuum sampling. Concentration data are usually obtained through vacuum sampling. In wipe sampling, a wet wipe (e.g., baby wipe) is used to collect dust from a surface with known area. Through laboratory analysis, the total lead picked up by the wipe is measured and compared to the surface area to calculate the dust-lead loading. Because the wipe sampling only measures the mass of the lead and not the total mass of the dust, the concentration of lead in the dust cannot be determined. In a wipe test, the mass of the dust is combined with the mass of the wipe which is typically unknown. Therefore, it is not possible to isolate the mass of the dust and compute the concentration.

In vacuum sampling, a specialized vacuum cleaner is used to collect dust from a surface with known area. Through laboratory analysis, the amount of lead picked up by the vacuum can be measured and compared to the surface area to calculate loading. Laboratory analysis also can yield the concentration measure because the only material in the sample is the dust (including the lead). It is, therefore, possible to obtain both the total mass of the dust (including the lead), and the mass of the lead alone. Concentration is calculated by dividing the mass of the lead by the total mass of the dust.

Ideally, EPA would favor the use of both loading and concentration data to characterize hazards and to identify appropriate response actions. Two examples help illustrate the value of using two measures. In the first example, a risk assessor finds high dust-lead loadings both in house A and in house B. Dust-lead concentration is high in house A, but low in house B. Without the concentration data, the risk assessor would treat both houses the same. With the concentration data, the risk assessor would be able to conclude that house A, with the high dust-lead concentration, has an on-going source of lead that needs to be identified and controlled. In house B, high loading combined with low concentration may indicate the presence of excessive dust that could be addressed through routine housecleaning. This example shows how the additional information provided by the concentration data allows the risk assessor to differentiate between two residences that have similar dust-lead loadings.

In the second example, a risk assessor finds high dust concentrations in both house X and house Y; the dust-lead loadings are high in X and low in Y. The concentration data suggest the presence of an on-going source of lead that should be identified and addressed. The loading data, however, indicate that only house X currently has a dust-lead hazard. Cleaning, the recommended control measure for dust-lead hazards, would likely be an effective risk reduction intervention in house X but probably would not be necessary at present in house Y. This example shows how the additional information provided by dust-lead loading data allows the risk assessor to differentiate between two houses that have similar dust-lead concentrations.

Although EPA acknowledges that both loading and concentration data would be valuable to a risk assessor, the Agency recognizes that setting standards based on both measures might impede implementation of hazard evaluation on a large scale (i.e., in the nation's housing). Currently, wipe sampling is the method that most risk assessors use. In contrast, few risk assessors are skilled in vacuum sampling (the method required for obtaining concentration data). Furthermore, vacuum samples require significantly more time to collect because the equipment needs to be cleaned between samples, resulting in higher costs for risk assessments. EPA, therefore, believes that a standard based on loading alone is more workable than a standard that uses both measures. For those risk assessors that use vacuum sampling or other methods of dust sampling, the Agency is planning to provide guidance on the use and interpretation of concentration data.

2. *Surfaces*. To date, Federal, State, and local agencies have traditionally tested for the presence of lead in dust on three horizontal surfaces: uncarpeted floors, interior window sills, and window troughs. The HUD Guidelines provide clearance levels for these three surfaces to evaluate post-abatement cleanup. EPA included these clearance levels in its 1994 guidance on lead-based paint hazards. In addition, 25 States currently have, are revising, or are promulgating standards for floors, sills, and troughs. The State standards are largely based on the HUD Guidelines and EPA's guidance (Ref. 97).

Although Title IV does not explicitly require it as part of the TSCA section 403 rule, EPA had to determine for which surfaces it would propose dust-lead hazard standards. EPA considered several factors in its decision. First, the Agency wanted to include surfaces that would enable risk assessors to adequately characterize risk. Second, it wanted to minimize the amount and complexity of sampling required in order to reduce the cost of risk assessments. Third, EPA did not want to deviate significantly from current approaches unless there was adequate justification.

Analyses performed by the Agency show that the dust on floors, sills, and troughs are highly correlated (Refs. 98 and 99). Of the three surfaces, however, the scientific literature suggests that floor dust-lead loadings are the dust-lead measure most relevant to childhood lead exposure. The child plays on the floor, thereby coming in contact with any settled dust containing lead. Lead dust loadings on sills and troughs are also significant measures but explain less of the variation in blood-lead concentrations (Ref. 100). For some data sets, lead dust loadings on sills are a better predictor of blood-lead concentrations than lead-dust loadings in troughs, while the opposite is true for other data sets (Ref. 101). In addition, sills and troughs are themselves highly correlated (Ref. 102).

Based on these data and analyses, the Agency has determined that standards should be proposed for floors and either sills or troughs. Proposing standards both for sills and troughs does not improve a risk assessor's ability to characterize risk sufficiently to justify the additional expense for sampling and analysis of both surfaces. EPA has decided to propose dust standards for sills but not troughs for two reasons. First, sills are easier to sample than troughs. Second, lead in troughs may be caused by direct deposits from exterior sources and therefore be less representative of typical interior levels than lead on sills. The Agency wishes to note that this approach is not intended to imply indifference to dust-lead levels in troughs. In fact, EPA is including a dust-lead clearance standard for troughs (discussed in Unit VIII. of this preamble) to ensure that troughs are adequately cleaned as part of a dust cleaning intervention.

EPA recognizes that its proposal not to establish dust levels for window troughs represents a departure from the interim guidance. That guidance, however, did not attempt to identify risk-based dust-lead levels. Rather, it adopted the HUD clearance levels for floors, window sills, and window troughs and suggested that they be used to identify ''hazards'' until the Agency was able to assess the risks from dust-lead on the various surfaces. Today's proposal is based upon these new analyses and presents standards for those surfaces that appear to adequately characterize a child's exposure to dust, namely floors and interior window sills.

The EPA requests comment on this difference. In particular, EPA requests comments on the impact of not having window trough dust levels on the accuracy, complexity, and cost of risk assessments. EPA also requests any new data or analysis concerning the relationships between dust on floors, sills, and troughs and childhood blood-lead concentrations that could help the Agency in setting hazard standards for window troughs.

3. *Carpeted floors*. Today's proposal does not include dust standards (contamination, hazard, or clearance) for carpeted floors. EPA made this decision because the Agency is unaware of adequate data that could be used to establish a statistical relationship between dust lead on carpeted floors and children's blood-lead concentrations. In the absence of a statistical relationship between children's blood-lead concentrations and dust lead on carpeted floors, EPA cannot estimate the level of risk and risk reduction that would be associated with various levels of dust-lead in carpeted floors. The Agency, therefore, is unable to select hazard standards that meet the statutory and policy criteria. Furthermore, EPA does not have adequate data on the effectiveness of carpet cleaning that would be needed to establish a dust clearance level for carpeted floors. When the data necessary to establish dust standards on carpeted floors become available, EPA plans to analyze them expeditiously and amend the regulations being proposed today to add standards for carpeted floors.

Because many residences built prior to 1978 have carpeted floors, EPA recognizes that the lack of standard for carpeted floors is a significant limitation on today's proposal. The Agency is therefore requesting comment on the impact of not including standards for carpeted floors. EPA would also be interested in any information or data that would help it establish such standards.

4. *Emergency dust level*. During the regulatory development process, several interested parties urged EPA to establish an emergency dust level as part of the TSCA section 403 rule (Ref. 13). Two purposes for an emergency level have been articulated. First, this level could be used to help property owners and other decision-makers set priorities for implementing hazard control interventions. Second, an emergency dust level could be used by local public health authorities to recommend or require specific drastic and immediate actions, such as removal of a child or immediate environmental intervention where dust levels exceeded the emergency threshold.

EPA believes that, while these goals are worthwhile, an emergency dust level is not needed either for priority-setting or for mandating specific actions. Priorities for intervention should be based on the ''worst-first'' approach where residences with the highest levels of lead are targeted for earliest response action. Furthermore, because response actions should be taken in all houses with hazards, EPA does not believe that its national program should establish a further priority for action. Such priorities should vary by location, occupants, housing availability, and other local factors.

With respect to mandating specific drastic and immediate actions, EPA believes that such a response to a lead-based paint hazard would be appropriate if exposure to very high levels of lead in dust presents an acute health risk, and drastic and immediate action is the only way to prevent further harm to the health of resident children. Although EPA is concerned about continuous exposure to very high levels of lead in dust, health threats in the United States today usually occur due to chronic rather than acute exposure to dust. In addition, drastic action should be taken in response to other important findings, such as an elevated child blood-lead concentration. The dust hazard standard should be sufficient for inducing prompt action by property owners or other decision-makers and providing adequate protection to child occupants.

In the event that EPA obtains information justifying the need for an emergency standard, the Agency has explored several approaches for setting an emergency dust standard. Under one approach, EPA would derive an emergency standard by applying a multiplier (e.g., 10) to the dust-lead hazard level. Although this approach is easy to understand, there is no direct link to severe human health risk. The second approach bases the emergency standard on dust levels found in the homes of children who have received medical treatment for lead poisoning. EPA believes that the second approach would be preferable because the level would be associated with exposure and risk. It has, however, several disadvantages. Many cases of severe lead poisoning result from ingestion of paint chips and not necessarily from dust ingestion (Ref. 95). In addition, dust measurements may have been obtained weeks or months after the blood-lead concentration was measured and may not reflect dust-lead levels that were present when the exposure occurred. For these reasons, the Agency's attempts to develop emergency dust levels using the second approach have not been successful. Thus, EPA lacks sufficient data to associate levels of lead in dust with specific cases of medically-managed lead poisoning. Nevertheless, EPA believes that this approach is the best currently available for setting an emergency dust-lead level.

The Agency is seeking comment on the issue of an emergency dust standard. The Agency is interested in comments concerning the need for an emergency dust standard, given the ready availability of blood-lead data. The Agency also seeks comments on whether and how an emergency standard would be used, including whether immediate responses are needed because lead from dust usually causes harm through chronic rather than acute exposures. In addition, EPA requests any data, analysis, or approach that would help the Agency set an appropriate emergency standard if the need for such a standard could be justified.

C. Soil Issues

1. *Dual standards for soil-lead level of concern*. During the Dialogue Process,

several interested parties suggested that EPA should establish two standards for soil-lead level of concern: a more stringent standard for ''play areas'' and a less stringent standard for other areas in a residential yard (Ref. 15). This suggestion was based on the hypothesis that there is less contact between children and the soil in ''non-play areas,'' resulting in lower exposure and risk. Proponents of this suggestion also cited EPA's July 14, 1994 guidance which established a separate advisory level for soils on non-residential property and where use by children is less likely. EPA wishes to note that the separate advisory level (2,000 ppm) presented in the 1994 guidance is intended for use at non-residential property and that the more stringent level (400 ppm) applies to all residential property, including ''non-play areas.''

The parties that proposed this option expressed two concerns about a single, more stringent standard for soil-lead level of concern applying to the whole yard. First, response costs would increase because interim controls (i.e., soil cover), the recommended response for the lower tier soil level in the guidance, would have to be applied to larger areas. Second, because it may not be feasible to install and maintain soil cover, property owners would have to perform full soil abatement, the response recommended for soil-lead hazards in order to provide adequate protection.

EPA rejected proposing separate soil-lead levels of concern for ''play areas'' and ''non-play areas'' on residential property for two reasons. First, the cost concern is based on this option because it is based on an incorrect interpretation of soil-lead level of concern. As noted in Unit II. of this preamble, the presence of a soil-lead level of concern does not trigger any regulatory requirements or legal obligation. The soil-lead level of concern is a risk communication tool. It is, therefore, appropriate that owners and occupants be aware of any soil on property where the lead concentration exceeds this level regardless of its location. If owners and occupants are aware of the presence of soil-lead level of concern, they can take actions to reduce exposure to children. Such actions can include applying soil cover and preventing children from playing in areas of a yard where lead levels equal or exceed the level of concern.

Second, EPA believes that it is infeasible to distinguish between ''play areas'' and ''non-play areas'' in many yards. Indicators of where children play, such as playground equipment, are not always present. In the Rochester study, ''play areas'' could not be identified at more than half the residences in the data set (Ref. 20). Even when such equipment is present, children's outdoor activity is not necessarily limited to that location. In addition, play patterns may change when a new family assumes occupancy following turnover of a residence. Nevertheless, the Agency recognizes that, at some residences, direct exposure to soil occurs mainly around play equipment. EPA believes, however, that it is more appropriate to address this issue in its sampling guidance by providing advice to risk assessors on where to collect soil samples. This issue is discussed further in Unit VII. of this preamble.

In light of the interest expressed by some stakeholders in a separate level of concern for ''play areas,'' EPA is seeking public comment on this issue. In particular, the Agency would like input on (1) a workable approach for identifying ''play areas'' that addresses the problems discussed above and (2) the technical basis for establishing a separate soil-lead level of concern. The available data and analytical tools enable the Agency to assess risk from soil on residential property but not in specific parts of a yard. EPA would also like the public to comment on whether a separate level of concern for ''play areas'' would be necessary if the soil-lead level of concern appears only in guidance and not in the regulation.

Another interested party suggested that the standard for soil-lead level of concern should apply to all ''play areas'' and to ''non-play areas'' only where lead levels in household dust continuously exceed the dust hazard standard (Ref. 17). This option is predicated on the assumption that the exposure pathway for ''non-play areas'' is track-in lead which would be measured through interior dust sampling. If there is no dust hazard, this party reasoned, then the lead in the ''non-play area'' soil does not present a health threat.

EPA rejected proposing this option for three reasons. First, EPA is not aware of any data that link exposure pathways to location of soil. Therefore, the Agency cannot assume that track-in contamination of household dust is the only pathway associated with ''non-play area'' soil. Second, as noted above, EPA believes that it is infeasible to distinguish between ''play areas'' and ''non-play areas'' in many yards. Third, the proposed dust standards are lead loading standards, which reflect a combination of the amount of dust present and the concentration of lead in that dust. The amount of dust on an interior surface at any particular time can be extremely variable and can depend upon cleaning procedures used in a residence and the length of time between cleaning and the collection of the dust sample. Also, the rate of soil entry into the home can vary depending upon such factors as the use of doormats and residents' preferences regarding leaving windows open. Given these variables, the Agency does not believe that a low interior dust-lead loading measurement at the time of a risk assessment could reasonably ensure that soil in any specific area of a yard (including ''non-play areas'') does not present a risk of concern to children.

2. *De minimis area of bare soil*. The definition of lead-contaminated soil in section 401 refers to bare soil which is not defined by the statute. Bare soil, as defined by HUD in its proposed regulations under sections 1012/1013 of Title X (61 FR 29206, June 7, 1996) is ''soil not covered by grass, sod, or other live ground covers, or by wood chips, gravel, artificial turf, or similar covering. Bare soil includes sand.'' EPA considered whether this definition is sufficient for the TSCA section 403 rule. Specifically, the Agency considered whether the rule should include a minimum (i.e., *de minimis*) area of bare soil as part of the lead hazard criteria.

The inclusion of a *de minimis* area of bare soil is based on two assumptions. First, there is a relationship between the amount of soil cover and exposure to lead in the soil. In yards with very small amounts of bare soil, it is presumed that exposure would be low. Second, a *de minimis* value would help target resources by eliminating the need to evaluate soil or respond to contamination or hazards for properties where there is only a small amount of bare soil. For example, the HUD Guidelines instruct risk assessors to sample yards that have at least 9 square feet of bare soil, with no *de minimis* in the ''play area'' (Ref. 11).

EPA considered three options for a bare soil *de minimis* area. Under the first option, EPA would adopt the *de minimis* area from the HUD Guidelines. Although, this approach is consistent with existing guidance, it would require risk assessors to measure the size of individual patches of bare soil. It also does not account for differences in lot size. Under the second approach, EPA would define the *de minimis* in terms of bare soil as a percent of the whole yard. The risk assessor would measure the percentage of bare soil using a specified technique (e.g., the line transect method used by soil conservationists to assess the erosion potential of cropland soil) (Ref. 103). This option was designed to simplify the process of measuring the area of bareness and to account for differences in yard size. Under the third option, EPA would not include a *de minimis* area of bare soil in the proposed regulations.

EPA decided not to include a *de minimis* area for bare soil because the disadvantages of each of the two approaches for establishing a *de minimis* outweighed the advantages. The *de minimis* used in the HUD Guidelines does not account for differences in yard size; 9 ft^2 outside of the ''play area'' may be insignificant in a suburban yard but large for the back yard of an urban row house. Although a percentage-based *de minimis* would account for different yard sizes, EPA has no analysis or data that relate the amount of bare soil to risk and, therefore, no basis upon which to select the *de minimis*. Furthermore, there is no existing government or consensus percentage-based standard that EPA could adopt.

EPA also believes that a *de minimis* area of bare soil provides little benefit. First, information provided by an experienced risk assessor suggests that very few properties would be excluded using the *de minimis* in the HUD Guidelines (Ref. 104). Second, the incremental cost of including soil testing in a risk assessment is small. Third, if a soil-lead hazard is present, the property owner or other decision-maker should take action to control the hazard and this action should address all soil where lead levels exceed the hazard standard whether or not it is bare.

3. *Covered soil.* Although Title IV of TSCA restricts the standard for soil-lead hazards to bare soil, EPA is concerned that the presence of soil cover, such as grass, may not reduce exposure to lead sufficiently. Consequently, it may be prudent to test covered soil to determine whether a soil-lead hazard exists.

The Agency, therefore, recommends that covered soil be tested in cases where the risk assessor has reason to believe that the level of lead in soil may constitute a soil-lead hazard. Factors that the risk assessor should consider include high soil-lead levels in bare sections of the yard where soil sampling was conducted, the presence of high dust-lead levels in a home that has no lead-based paint, the presence of children with elevated blood-lead levels in the community, high soil-lead levels in neighboring yards, the presence of nearby industrial sources, the presence of a nearby steel structure such as a bridge or highway overpass, and the past use of the property. It is important to note that testing of covered soil is only a recommendation. The standards being proposed under TSCA section 403 do not apply to covered soil, and the testing of covered soil is not required by the regulations promulgated under authority of TSCA section 402 at 40 CFR 745.227(d) as amended by today's proposal.

4. *Soil-lead level of concern standard becoming de facto hazard standard.* Interested parties expressed concern about the potential confusion over the two standards for soil. Specifically, some parties feared that the standard for soil-lead level of concern could become the *de facto* hazard standard for soil, leading to soil abatement at millions of homes.

EPA believes, however, that there is no basis for this concern. First, as proposed in today's action, the level of concern will appear only in guidance, not in the rule.

Second, the Agency will clearly explain the differences between the two levels in its public outreach documents and education efforts. The two standards are based on different criteria and have different purposes. The level of concern is a tool to communicate risk and is based on an individual child having a one to five percent probability of equaling or exceeding a blood-lead concentration of 10 µg/dl. Thus, EPA believes that soils with lead levels that exceed the level of concern present a level of risk to children of sufficient concern that a variety of actions should be considered to reduce exposure (e.g., soil cover, door mats, hand and toy washing). The standard for a soil-lead hazard, in contrast, is based on greater certainty regarding probability of harm. The presence of a hazard indicates that the cost of intensive controls (e.g., soil removal) is commensurate with the level of risk reduction that could be achieved.

Third, EPA's 1994 guidance on lead-based paint hazards contains multiple levels for soil, and yet there is no evidence that the public thinks that abatement is the recommended action at 400 ppm, the lower level in the guidance.

D. Sample Collection and Analysis

Numerical standards for lead in paint, dust, and soil have little significance in the absence of information about how the samples were collected and analyzed. In order for the sampling results to be useful, they must be reliable. Several conditions have to be met to consider sampling results reliable. First, assurances are needed that the individual who collected the samples has the appropriate training and expertise. These individuals must be familiar with specific requirements regarding sample collection and handling. They also must be skilled in sampling techniques and able to make critical subjective judgments about the number and location of samples to collect. For example, if a risk assessor fails to measure the area of a dust wipe sample accurately, the results will be invalid. Sample handling is also important because contamination of samples can invalidate results.

Second, reliability of sampling results is dependent upon the quality of laboratory analysis. Laboratories must adhere to strict quality assurance and quality control procedures to ensure that samples are analyzed properly. These procedures address, among other things, contamination of samples and the calibration of laboratory instruments. Contamination of samples can have a significant effect on sampling results and invalidate them. Similarly, laboratory instruments that are out of calibration can yield erroneous results.

EPA has several options for ensuring that the sampling results are reliable and are comparable to standards. Under the first option, the Agency could tie the standards to specific methods. This approach has the advantage that it uses methods known to EPA to be reliable and effective. The major disadvantage is that it references specific technologies. As technologies change, the Agency would have to amend the rule to reflect these changes. Referencing specific technologies in a regulation could also stifle technological innovation.

Alternatively, under a second option, EPA could adopt an approach that relies on the performance of its training and certification program for workers and contractors and its accreditation program for laboratories and only specify the type of samples to be collected and analyzed. Under this approach, EPA would assume that compliance with applicable (i.e., Federal, State, Tribal) certification standards for workers and contractors and laboratory accreditation through the National Lead Laboratory Accreditation Program (NLLAP) ensures that samples are being collected, handled, and analyzed in a manner that the results can be reliably compared to the TSCA section 403 standards.

EPA has decided to propose tying the TSCA section 403 standards to risk assessments conducted according to the risk assessment work practice standards found at 40 CFR 745.227. This approach assures that samples can be reliably compared to the TSCA section 403 standards while more easily accommodating technological change than an approach that references specific technologies.

Accordingly, EPA is proposing that the determination of whether *in-situ* paint on a specific component is lead-based shall be made by a certified risk assessor. If confirmatory laboratory analysis is necessary, paint chip samples must be analyzed by a laboratory recognized by EPA as proficient for paint analysis. A certified risk assessor shall determine whether the paint is in poor condition based on visual observation. Dust-lead loadings shall be determined from wipe samples collected from uncarpeted floors, interior window sills, and window troughs by a certified risk assessor and analyzed by a recognized laboratory. Soil-lead concentrations shall be determined from samples collected by a certified risk assessor and analyzed by a recognized laboratory.

VI. Requirements for Interpreting Sampling Results

Under this proposal, to determine whether lead-based paint hazards are present at a residence, a risk assessor would have to compare his/her measurements and observations to the hazard and level of concern standards in this proposed rule. Unit IV. of this preamble presented the proposed lead-based paint hazard standards. Regulations promulgated by EPA as part of the TSCA section 402 training and certification rule, at 40 CFR 745.227, establish work practice standards for risk assessments. Neither the proposed lead-based paint hazard standards nor the work practice standards, however, prescribe how a risk assessor should compare his/her measurements and observations with the proposed standards. Therefore, under authority of TSCA section 403, EPA is proposing implementation requirements that will prescribe how a risk assessor should compare his/her measurements and observations to the proposed standards. This unit of the preamble presents these proposed requirements and the Agency's rationale for its decisions.

A. Paint

According to the regulations at 40 CFR 745.227(d), the risk assessor identifies and tests all painted surfaces that are in poor condition (i.e., where deteriorated paint exceeds the proposed minimum surface area requirements) and are determined to have a distinct painting history to determine whether the paint is lead-based. EPA is proposing that results of this sampling be interpreted in the following manner. If the testing confirms that the paint is lead-based, then lead-based paint in poor condition on that component and other like components with a similar painting history is considered hazardous lead-based paint. This approach for interpreting the paint sampling is based on inductive logic; if the tested component is covered with lead-based paint, then other like components with similar painting histories are covered with lead-based paint. This approach is consistent with the HUD Guidelines (Ref. 11).

Risk assessors have the option of using composite samples rather than single surface samples. Because composite samples provide an average level of lead, low values on some surfaces may mask the presence of lead-based paint on other surfaces. EPA is, therefore, proposing to adopt the approach recommended in the HUD Guidelines that the standard for lead-based paint (1 mg/cm^2 or 0.5 percent by weight) be divided by the number of subsamples in the composite (Ref. 11). For example, if a composite sample contains five subsamples, the risk assessor would compare the results to a standard of 0.2 mg/cm^2 or 0.1 percent by weight. Using this approach, it is mathematically impossible for the composite to pass when any single subsample exceeds the 1 mg/cm^2 or 0.5 percent by weight standard for lead-based paint.

It is important to note the composite paint sampling is essentially a negative screen. It can be used to demonstrate that lead-based paint is not present, but cannot be used to identify which component has lead-based paint if the results indicate that lead-based paint is present. If a composite sample shows that lead-based paint is present, the risk assessor would need to take single surface samples to identify the specific component(s) that contains lead-based paint.

B. Dust

1. *Single-family housing.* Risk assessors can take two kinds of dust samples: single surface samples which yield a result for the specific surface that was sampled; or composite samples which yield an average result that applies to all the surfaces that were sampled. The interpretation of the composite sample is straightforward. The risk assessor compares the result of the composite sample to the standard for dust-lead hazards. For single surface samples and multiple composite samples, EPA is proposing that the risk assessor should compare the average, weighted by the number of subsamples in each sample, to the standard for dust-lead hazard. Under this approach each single surface sample would have a weight of one.

The Agency is proposing this approach because, in the absence of information on the amount of exposure that occurs in each location, the average of single surface samples reasonably reflects a child's typical exposure to lead in dust. This same rationale was used to design the methodology for the Agency's risk analysis. Because average exposure was used to estimate risk and choose the standard, it is appropriate to adopt a consistent approach for interpretation of dust samples. Using a weighted average gives the subsamples in a composite the same weight as single surface samples and better reflects average exposure to lead in dust.

EPA recognizes that averaging single surface samples yields the same numerical result as a composite sample, and that this might serve as a disincentive to conduct single surface sampling. The Agency believes, however, that single surface sampling can yield valuable information that can help a risk assessor identify sources of contamination and/or recommend hazard control strategies that target particular parts of a home. For example, single surface sampling may show that dust-lead levels are well above the hazard standard in the entry hall of a home but below the standard elsewhere. Using the averaging approach, if the entry hall levels are sufficiently high, the risk assessor would determine that there is a dust-lead hazard. By interpreting the results of the single surface samples, however, the risk assessor may be able to determine the source of the dust contamination is exterior soil or dust tracked-into the entry hall and not interior paint. In addition, the risk assessor may recommend that dust cleaning be focused on the entry hall, rather than the whole house. Whether the information provided by single surface samples justifies the cost will be a site-specific decision.

2. *Multi-family housing*—a. *Dwelling units.* In multi-family housing, a risk assessor would use the approach for single-family homes to interpret the results of sampling in each unit where samples were collected. There is an additional issue that must be addressed in multi-family housing because the sampling guidance, which is based on the HUD Guidelines, will provide several approaches to the risk assessor for collecting dust samples from a limited number of units. Because no dust samples would be collected from many units under these approaches, the risk assessor would have to make assumptions about dust levels in units that are not sampled. This issue does not apply to buildings that contain from two to four units because the risk assessor would have to collect samples in all units.

EPA considered three alternatives for identifying dust-lead hazards in units that are not sampled in multi-family housing.

Option 1. Under option one, the risk assessor would assume that dust-lead hazards are present in all unsampled units if dust-lead hazards are identified in at least one sampled unit. The risk assessor would assume that unsampled units do not contain lead-based paint hazards only if no dust-lead hazards are identified in the sampled units. In other words, a sampled unit where dust-lead hazards is present would represent all unsampled units.

Option 2. Under this option, the risk assessor could refine assumptions about unsampled units if he/she could establish a pattern for units that have dust-lead hazards. For example, testing results may show that only first floor units have dust-lead hazards and soil-lead exceeds the level of concern on the property. The risk assessor could conclude from this information that the dust is being contaminated by the soil and that this pathway of contamination applies only to first floor units. Therefore, only unsampled first floor units should be assumed to have dust-lead hazards.

Option 3. This option applies only to risk assessors who use random sampling to select units for testing. The random sampling protocol is based on the specification that the number of sampled units provides 95 percent confidence that fewer than 5 percent of all units in the building(s) (or 50 units, whichever is less) contain dust-lead hazards if no sampled units have hazards. Under this option, the risk assessor could randomly test a sufficient number of additional units to achieve the same specification when some units originally tested have hazards.

The Agency selected the first option for the proposed rule. Although EPA recognizes that some unsampled units would be identified as having dust-lead hazards even if dust levels in those units are below the proposed standards, it is not possible to determine which unsampled units would have hazards in the absence of additional data. The only protective approach, therefore, is to assume that all unsampled units have hazards.

Because this approach may identify some units that do not have dust-lead hazards as having hazards, EPA would encourage property owners, who are faced with this situation, to test the dust in units that were not initially sampled. This additional information would allow the risk assessor to determine whether dust hazards are actually present in these units. In light of the cost of testing and possible cleaning in a large number of units, the property owner may consider focusing attention first on units where young children are present. Dust testing and cleaning at other units could wait until unit turnover.

EPA is not proposing the two other options because they are unlikely to be practical or useful. Option 2 would not be beneficial because, given the variability of dust loading levels, risk assessors would probably not be able to identify patterns of hazard. Option 3 offers little value because there is a high probability that an additional unit would fail requiring the risk assessor to conduct dust testing in even more units. In the end, the risk assessor would likely test dust in nearly all the units.

Because the proposed approach for interpreting the results of dust testing in multi-family housing is not optimal (i.e., it may falsely identify some units as having dust-lead hazards), the Agency is seeking comment on this issue. Specifically, EPA would be interested in an alternative approach and the data and rationale used to support an alternative. The Agency is also interested in comment on the two options it considered but rejected.

b. *Common areas.* The same approach for interpreting dust samples would apply to common areas. For common areas that can be grouped together such as hallways, the risk assessor could test dust from a random, targeted, or worst-case sample if there are a sufficient number of areas. The risk assessor would assume that dust-lead hazards are present in the unsampled common areas if a dust-lead hazard is present in at least one of the sampled common areas. For common areas that cannot be grouped together (e.g., entry lobbies, basement laundry rooms), the risk assessors would treat each area as a separate dwelling unit and collect dust samples from all such areas. The risk assessor would interpret the dust sample results for each area according to the requirements for single-family homes described above.

C. Soil

EPA is proposing that the interpretation of soil samples would use techniques similar to those employed for the interpretation of dust samples. The risk assessor would compare the average concentration of the dripline and mid-yard composites to the soil-lead hazard standard. If the risk assessor collects more than one dripline or mid-yard composite sample, he/she would first compute the average concentration in the dripline and/or in the mid-yard and then compute the average of the dripline and mid-yard concentrations. The approach of using the average concentration is based on the rationale stated above for the interpretation of dust samples. Risk assessors would use the above approach for each building in a multi-family housing development and compare the average for all buildings to the soil-lead hazard standard.

The use of sampling data, however, should not be limited to determining whether a hazard exists. Soil samples can provide valuable information to the risk assessor about the location and extent of soil contamination, which can help the assessor design a targeted control strategy. For example, a risk assessor may determine, based on the average of the dripline composite sample and mid-yard composite sample, that a yard exceeds the soil-lead hazard standard. The individual composite samples may show, however, that the soil in the dripline is above the hazard standard but the mid-yard soil is not. This information enables the risk assessor to design a strategy that focuses controls for soil solely in the dripline. Examining the results of individual composite samples would be especially valuable in a multi-family housing development where focusing soil intervention on relatively small areas can reduce the costs of intervention significantly.

In addition, as EPA will detail in the guidance document on using the hazard standards, the Agency recommends that when the remediation strategy is developed, that areas with highest lead levels be addressed first. For example, if dripline soil is 3,500 ppm and mid-yard soil is 500 ppm (i.e., yard-wide average of 2,000 ppm), the strategy to reduce average levels below 2,000 ppm should rely first on removing the highly contaminated soil at the dripline rather than on covering the moderately contaminated soil at the mid-yard.

VII. Amendments to TSCA Section 402 Regulations

This unit of the preamble presents proposed amendments to the work practice standards for risk assessments and abatements promulgated under the authority of TSCA section 402 at 40 CFR 745.227 along with EPA's rationale for its decisions. These amendments would include the establishment of dust clearance standards, management controls for soil removed during an abatement, and changes to existing dust and soil sampling provisions. EPA did not include clearance standards as part of the original TSCA section 402 rule because the Agency thought that it was more appropriate to establish these standards together with the TSCA section 403 hazard standards. Amendments to the sampling provisions are necessary because the work practice standards were developed prior to the TSCA section 403 regulations. Therefore several previously developed sampling provisions are not compatible with the hazard standards proposed in this rule. EPA is proposing management controls for soil removed during an abatement because of concern that soil removed from one yard could be disposed of in the yard of another residential property or child-occupied facility.

When EPA finalizes the regulations being proposed today, the Agency will also issue conforming amendments to the section 402 regulations to ensure consistency in terminology between the regulations. These conforming amendments will most likely focus on references to the terms lead-contaminated dust and lead-contaminated soil which are not included in today's proposal.

A. Clearance Standards

Under the authority of section 402 of TSCA, EPA is proposing clearance standards for dust in today's proposed rule. Clearance standards are used by certified individuals to evaluate the adequacy of the cleanup performed in residences at the completion of abatement. According to the practices prescribed at 40 CFR 745.227, a certified risk assessor or inspector must collect dust samples and have them analyzed by an accredited laboratory following the cleanup to assure that the cleanup reduced dust-lead levels to the levels prescribed in today's proposal. If the clearance levels are not met, the cleanup and testing process must be repeated until the clearance standards are met. Although clearance testing is not required following implementation of interim controls (e.g., paint repair), the Agency strongly recommends such testing to ensure that the residence has been adequately cleaned.

TSCA section 402 establishes three criteria for performing lead-based paint activities: reliability, effectiveness, and safety. EPA is reluctant to propose an approach that mandates a specific technology. In fact, the Agency wants to promote technological innovation that could result in less costly products and practices that are equally or more effective.

Consequently, EPA is proposing that these criteria should apply to numerical dust lead clearance levels. Under this approach, the Agency would be establishing standards that are achievable using products and methods known to be reliable and effective. Specifically, EPA has decided to base the clearance standards on the performance of the cleanup method recommended in the HUD Guidelines which is currently considered state of the art. This method involves a combination of a wet wash with an all-purpose or lead-specific cleaner and HEPA vacuuming. Although clearance standards are based on dust-lead levels achievable using this method, the standard does not require this method. Any cleanup method would be satisfactory as long as the clearance standard is met. This approach ensures that the cleanup was reliable and effective while providing an incentive for entrepreneurs to develop less costly technologies that can meet the standard.

EPA considers safety, for purposes of clearance, to be a level of lead in dust that is a associated with the risk level of concern (i.e., a one to five percent probability that a child will have a blood-lead concentration equal to or exceeding 10 μg/dl). As is the case with a clearance standard that is effective and reliable, a safe clearance standard would not prescribe a specific cleaning technology; any technology would be acceptable as long as it is able to reduce dust-lead loadings to ''safe'' levels.

The clearance standards must also be evaluated within the broader context of Title X and its purposes. In particular, EPA must select clearance standards that are compatible with the development of a workable framework for lead-based paint hazard evaluation and reduction.

1. *Clearance standard for floors and sills*. The available field data documenting experience with the cleaning protocol recommended in the HUD Guidelines do not identify obvious candidates for clearance standards (Ref. 105). Instead, use of the protocol yields a range of dust loadings. It should be noted that these data were collected under the controlled conditions associated with field studies. In practice, higher post-cleanup dust-lead levels should be expected.

EPA's analysis of data from HUD demonstration projects and five State and local programs shows that the median dust-lead loading for floors after the first clearance test was 25 μg/ft^2 with a 90th percentile loading of 187 μg/ft^2. The median dust-lead loading for interior window sills was 33 μg/ft^2 and the 90th percentile was 475 μg/ft^2. These data show that there is significant overlap among the dust-lead loadings achievable using the HUD cleaning protocol and the levels of lead in dust associated with the risk level of concern and the dust-lead hazard level.

EPA has decided, therefore, to propose clearance standards that are the same as the dust-lead hazard standard, 50 μg/ft^2 for uncarpeted floors and 250 μg/ft^2 interior window sills. This decision as based primarily on choosing standards that are consistent with the available data and that are as easy as possible to understand and implement. The other option considered was to select a clearance standard that is lower than the hazard standard.

EPA is concerned that separate clearance and hazard standards would be difficult for property owners and other decision-makers to understand. Especially troublesome are post-cleanup dust loadings that exceed clearance standard but not the hazard standard. Recleaning would be required in response to the clearance test, but no action would be indicated if the same loading was measured prior to intervention. Although this situation would be technically justifiable because hazard and clearance standards serve different purposes (indicator of risk vs. indicator of cleaning adequacy), it may seem to be inconsistent to owners and other decision-makers and make the standards difficult to understand. This situation is avoided by having both the hazard and clearance standards set at the same dust-lead loading.

Another argument that has been made to support separate hazard and clearance standards is to provide a margin that allows for reaccumulation of lead in dust following the cleanup. In the absence of this margin, there is a concern that a residence could have a dust-lead hazard soon after hazard control interventions were performed. The field data show, however, that in most circumstances reaccumulation will not result in the immediate reappearance of a dust-lead hazard because the majority of residences would be cleaned to levels well below clearance (Ref. 105).

2. *Clearance standard for window troughs*. The Agency considered two alternatives for window trough clearance standards: 800 μg/ft^2, the standard in the HUD Guidelines; and a ''no-visible'' dust standard. The first option has the advantage that it is consistent with existing practice, ensures that troughs will be adequately cleaned, and meets the statutory criteria. The ''no-visible'' clearance standard does not require follow-up dust testing of the trough. Although, data suggest that troughs have been adequately cleaned if there is no visible dust and debris in the window troughs and the clearance standards for uncarpeted floors and interior window sills are met, these data were collected when there

was a trough clearance standard that had to be met (Ref. 105). In the absence of a clearance standard, there is no assurance that troughs would be cleaned as well. EPA, therefore, has decided to propose adopting the existing HUD clearance level for troughs. Although this option would require trough sampling, it is expected that the incremental cost for clearance sampling would be $5 to $10 depending on the number of composite samples taken.

3. *Interpretation of dust clearance samples.* The work practice standards at 40 CFR 745.227 already include a provision for interpreting dust clearance samples, which states that if a clearance sample fails, all components represented by the failed sample shall be recleaned. This provision, however, does not differentiate between single surface samples and composite samples. Because composite samples provide an average level of lead, low values on some surfaces may mask the presence of lead levels that exceed clearance standards on other surfaces. In fact, EPA's analysis of empirical clearance testing data shows that there is a 57 percent chance that a composite sample would pass clearance even if any individual subsample would have failed the clearance test using the clearance standard (i.e., false passing) (Ref. 105). False passing introduces the possibility that a post-abatement cleanup would be judged to be adequate when, in fact, it was not. There are no ''false failures'' for composite samples under this approach (Ref. 105). Consequently, EPA developed and analyzed two options for amending the requirements at 40 CFR 745.227(e)(8) to include separate provisions for interpreting the results of composite dust clearance samples.

Option 1. The first option is the most stringent. Under this option, the risk assessor would divide the clearance standard by the number of subsamples in the composite. For example, if a composite floor sample contained four subsamples, the risk assessor would compare the loading from the composite sample to 12.5 μg/ft^2 (i.e., the floor clearance standard divided by four). This approach is analogous to that being proposed above for interpretation of composite paint samples. Using this approach, it is mathematically impossible for the composite to pass when any single subsample exceeds the 1 mg/cm^2 or 0.5 percent by weight standard for lead-based paint. It would, however, introduce the possibility of a composite sample failing clearance even if all the subsamples would have passed clearance individually (i.e., false failure), leading to additional clean up activities that may not be necessary. EPA's analysis of the empirical data shows that there is an 18 percent chance of having a false failure (Ref. 105).

Option 2. The second option is a middle ground approach between using the clearance standard for single surfaces samples and option one. Under this option, the risk assessor would compare the result of composite dust clearance samples to twice the value of the clearance level calculated in option one. That is, the risk assessor would compare the composite sample lead loading to $2CS/n$, where CS is the clearance standard for single surface samples and n is the number of sub-samples in the composite. EPA's analysis of the empirical data shows that under this option there is a 5 percent chance of failing clearance when all subsamples pass individually and a 22 percent chance of passing clearance when at least one of the subsamples would have failed clearance.

EPA selected option one for the proposed amendment because it provides the best balance of safety, effectiveness, and reliability. The false failure error probability for option one, 18 percent, is lower than the false passing probability (57 percent) using single surface clearance standards. Moving from option one to option two, the improvement in false failure probability, which declines from 18 percent to 5 percent, is smaller than the decline in false passing probability, which increases from zero percent under option one to 22 percent under option 2. The Agency specifically asks for comment on this approach.

B. Amendments to Sampling Requirements

1. *Risk assessment and clearance dust sampling.* As stated above, 40 CFR 745.227(d) requires risk assessors to collect dust samples from windows without specifying whether the samples should be collected from window sills, window troughs, or other surfaces. EPA adopted this general approach when promulgating the 402 regulation because the TSCA section 403 standards, which would specify hazard standards for only certain surfaces, were not yet in place. In the absence of standards, the decision on where to collect samples was left to risk assessors, based on their experience and training.

Because EPA is now proposing dust-lead hazard standards for window sills but not for troughs, risk assessors would only need to collect dust samples from window sills; dust samples for windows troughs would not be necessary. EPA, therefore, is proposing to amend 40 CFR 745.227(d)(5) and 40 CFR 745.227(d)(6) to specify that dust samples be collected from window sills for risk assessment.

Because EPA is proposing clearance standards for window sills and troughs, risk assessors would need to collect dust samples from both surfaces. EPA, therefore, is proposing to amend 40 CFR 745.227(e)(8)(v)(A) and 40 CFR 745.227(e)(8)(v)(B) to specify that dust samples be collected from both interior window sills and window troughs for clearance sampling.

2. *Soil sampling.* A third sampling provision that requires amendent is the location of soil sampling. Currently, 40 CFR 745.227(d) requires the risk assessor to collect soil samples from the dripline and the ''play area.'' The rationale for specifying these two locations was that the ''play area'' was most representative of a child's exposure to lead in soil and the dripline represents the worst-case exposure to lead in soil. Additional review of this issue during development of today's proposal, however, suggests that these sampling locations should be changed to the dripline and the middle of the yard.

EPA is proposing this amendment, because the Agency believes that, in the absence of site-specific information about a child's play pattern, a child's exposure to lead in soil is best reflected by the average soil-lead level in a yard. First, it is the Agency's judgment that it is not feasible for risk assessors to improve on this average exposure assumption for many properties. Indicators of where children play, such as playground equipment, are not always present. Even when such equipment is present, children's outdoor activity is not necessarily limited to that location. Additionally, play patterns may change when a new family assumes occupancy following sale of a residence, a time when many risk assessments may occur, due to the opportunity provided to buyers under section 1018 of Title X.

Second, the data show that the average of composite samples taken from the dripline and the mid-yard provides a reasonable estimate of yard-wide soil-lead levels. Lead concentrations are often distributed in predictable patterns, with the largest differences in lead levels found between the soil around the building perimeter (i.e., the dripline) and the mid-yard soil. For example, the median concentration in the dripline in the HUD National Survey is 448 ppm while the mean mid-yard concentration is 204 ppm (Ref. 8).

Two factors explain this pattern. Dripline soil may be contaminated by deteriorating exterior lead-based paint. For properties that do not have exterior lead-based paint, it has been suggested that exterior wall surfaces capture lead aerosol particles (from the past combustion of leaded gasoline), which in turn wash off and accumulate in the soils around buildings (Ref. 106).

C. Management Controls for Soil

Under the abatement work practice standards, there are no management controls for soil that is removed during an abatement. At the final Dialogue Process meeting, stakeholders expressed concern that this soil could be reused improperly (e.g., as topsoil at another residential property) (Ref. 16). EPA agrees that the lack of management controls for abated soil is a significant gap in the regulatory framework. To respond to this issue, the Agency identified two options.

Under the first option, EPA would propose that the reuse of removed soil as topsoil at another residential property or child-occupied facility be prohibited. This option addresses the most egregious misuse of removed soil but may not adequately deal with other potential abuses. The second option would involve the development of comprehensive management controls. Comprehensive controls would ensure that soil removals are safe, reliable, and effective. Development of such controls, however, could further delay the rule.

EPA chose the first option. It addresses the worst abuse and can be done without further delaying the rule. The Agency will examine this issue further and determine whether more comprehensive controls are required. If so, these controls would be proposed as a separate amendment to the soil abatement work practice standards. To assist EPA in its examination of this issue, EPA is interested in obtaining comment on the types of practices that should be prohibited and on the types of controls that should be considered.

VIII. Effect of TSCA Section 403 Standards on Other Title X Regulations and Programs

The term ''lead-based paint hazard'' is used throughout Title X. As a result, TSCA section 403 standards will affect the implementation of other Title X programs. This unit of the preamble describes the impact of the proposed standards on the other Title X programs.

A. HUD Programs

1. *HUD grants.* Under section 1011 of Title X, HUD issues grants for the evaluation and reduction of lead-based paint hazards in privately owned, low-income housing. Once today's proposal has been promulgated, clearance testing would have to be conducted following abatements performed with grant funding.

2. *Requirements for Federally-assisted or Federally-owned housing.* Under sections 1012 and 1013 of Title X, HUD is establishing lead-based paint hazard notification, evaluation, and reduction requirements for certain pre-1978 HUD-associated and Federally-owned (prior to sale to the public) housing. The programs covered by these requirements range from HUD-owned housing to single-family insured housing. For programs where hazard evaluation is required, the TSCA section 403 standards, when finalized, will provide criteria to risk assessors for identifying lead-based paint hazards in residences covered by these programs. For programs that require abatement of lead-based paint hazards, the TSCA section 403 standards shall be used to identify residences that contain lead-based paint hazards to determine where abatement will be necessary.

HUD proposed regulations under 1012 and 1013 on June 7, 1996 (61 FR 29170) that reflected EPA's lead-based paint hazard guidance. HUD is required to incorporate the TSCA section 403 standards, or more stringent standards, directly into its final rule or to cross-reference the standards.

3. *HUD Guidelines* The HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing were developed in 1995 under section 1017 of Title X. They provide detailed, comprehensive, technical information on how to identify lead-based paint hazards posed by paint, dust, and soil in residential housing and how to control such hazards safely and efficiently. Although the TSCA section 403 standards will have no regulatory impact on the Guidelines, the Guidelines will be revised periodically to incorporate new information, technological advances, and new Federal regulations, including EPA's lead-based paint hazard standards.

Chapter 5 of the Guidelines on risk assessment would need to be updated to incorporate the standards for lead-based paint hazards. For example, the discussion of the following topics would need to be revised: hazard levels for deteriorated paint, dust (for both risk assessment and screening of dwellings in good condition), and bare soil; and interpretation of sampling results. The clearance standards in Chapter 15 also would need to be revised to be consistent with the TSCA section 403 standards.

4. *Real estate disclosure requirements.* On March 6, 1996 (61 FR 9064) (FRL–5347–9), pursuant to section 1018 of Title X, HUD and EPA jointly issued regulations requiring sellers or lessors of most pre-1978 housing to disclose the presence of known lead-based paint and lead-based paint hazards and provide the potential purchaser or lessee with a copy of the pamphlet, *Protect Your Family from Lead in Your Home*. In addition, sellers must provide a 10–day period to buyers to conduct a risk assessment or inspection for the presence of lead-based paint and lead-based paint hazards. Sellers and lessors must also include warning language in sales contracts (24 CFR part 35, subpart H; 40 CFR part 745, subpart F).

To date, owners have relied on EPA's guidance for advice about conditions that may be considered lead-based paint hazards. By establishing regulatory standards for lead-based paint hazards, the TSCA section 403 rule will provide criteria for triggering certain disclosure by property owners. Furthermore, because the TSCA section 403 standards will be based on a comprehensive analysis of the most recent data and research available, they will offer buyers and lessees a better tool for interpreting risk assessment reports provided by property owners. As part of EPA's outreach efforts in this area, the Agency is planning to provide guidance on how to use the TSCA section 403 standards to interpret sampling results in risk assessment reports. Disclosure of the presence of lead-based paint is unaffected by the TSCA section 403 standards.

B. EPA Programs

1. *Training, accreditation, and certification requirements and work practice standards.* Under TSCA section 402(a), EPA issued a regulation on August 29, 1996 (61 FR 45778), at 40 CFR part 745 requiring individuals engaged in lead-based paint activities in target housing and child-occupied facilities to be trained; these individuals and contractors engaged in the same activities to be certified; and training programs to be accredited. These regulations also contain work practice standards for performing lead-based paint activities, including risk assessments, taking into account reliability, effectiveness, and safety.

The most significant impact of the TSCA section 403 standards on the training and certification programs concerns the determination of when certified workers and contractors are required to perform abatements. According to the training and certification regulations at 40 CFR 745.223, abatement is defined as the permanent elimination of lead-based paint hazards, and must be performed by certified individuals and contractors unless it is performed by the property owner in an owner-occupied residence (40 CFR 745.220(b)). By identifying lead-based paint hazards, the TSCA section 403 regulations help owners determine when work needs to be performed by certified individuals and contractors.

Today's action also contains proposed changes to the TSCA section 402 regulations. These changes include: the establishment of clearance standards for dust; amendments related to risk assessment and clearance sampling for dust, and sampling for soil; management controls for abated soil; and amendments changing the references to the lead-based paint hazard guidance to the TSCA section 403 regulations when final. The final TSCA section 403 regulations and the accompanying amendments to TSCA section 402 will necessitate changes to EPA's model training curricula in the areas of hazard standards, related underlying advances in scientific and technical information, risk assessment sampling, interpretation of sampling results, approaches for hazard control, and clearance standards.

2. *State Programs*. In conjunction with the TSCA section 402 regulations described above, EPA adopted procedures for States and Indian Tribes to follow when applying to EPA for authorization to administer and enforce a State or Tribal lead-based paint program (40 CFR 745.324). EPA considers standards for lead-based paint hazards and soil-lead level of concern, dust-lead clearance standards, and associated requirements for sampling and interpreting sampling results to be an integral part of the work practice standards for risk assessments and abatements. Therefore, EPA is proposing amendments to subpart Q that would require States and Tribes to establish standards and requirements that are as protective as the Federal standards being proposed today.

States and Tribes that apply for authorization following the date that is 2 years after promulgation of the rule would have to demonstrate, as part of their application for program authorization, that their standards are as protective as the Federal standards. Today's proposed amendment would require all other States and Tribes that wish to retain authorization to demonstrate to EPA's satisfaction that their standards are as protective as the Federal standards within 2 years of the promulgation of the rule. To minimize the reporting burden, these States and Tribes would apply to retain authorization as part of their reports to EPA in accordance with 40 CFR 745.324(h).

As a general matter, States and Tribes that apply to obtain or retain authorization that incorporate the same standards or standards that are more stringent than the Federal standards will meet the ''as protective as'' criteria. States and Indian Tribes that incorporate less stringent standards would have to provide analytical support and other documentation demonstrating that their standards are ''as protective as'' the Federal standards. For example, a State or Tribe may demonstrate that a higher soil-lead hazard standard could be ''as protective as'' the Federal standard because most of the lead found in the soil is less bioavailable than lead considered by the Agency. EPA plans to develop specific guidance on the types of analysis and documentation that a State or Tribe would need to provide to make such a demonstration.

3. *Real estate disclosure requirements*. EPA and HUD jointly developed these requirements. The effects of the TSCA section 403 lead hazard standards on real estate disclosure requirements were discussed previously in reference to the HUD programs.

4. *Public outreach programs*. EPA, in conjunction with HUD and other Federal agencies, has developed various public education programs, such as the National Lead Information Center and outreach campaigns targeting housing providers, health care professionals, the media, persons involved in real estate transactions, and the general public. When promulgated, the TSCA section 403 standards will play a significant role in this public education. Information regarding these standards will communicate the Agency's best judgment concerning the identification of lead-based paint hazards to property owners, State and local officials, tenants, and other decision-makers. To assist in this education, the Agency will be developing materials specifically addressing the TSCA section 403 standards, including a fact sheet and questions and answers bulletin. In addition, some existing outreach materials will be modified to discuss the TSCA section 403 standards or to reference materials with such discussion.

IX. Relationship of TSCA Section 403 Standards to Other EPA Programs

Because lead exposures occur through all media, a variety of EPA programs, in addition to the TSCA Title IV program, address residential lead contamination and lead in soil. The Resource Conservation and Recovery Act (RCRA) regulates as hazardous certain wastes containing lead, including some wastes that may be generated during lead-based paint activities. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) and the RCRA corrective action programs clean up lead released into the environment. EPA's Indoor Air program also seeks to reduce contamination of the indoor environment by substances including lead. This unit describes the relationships between the proposed TSCA section 403 standards and each of these EPA programs.

A. RCRA Hazardous Waste Requirements

Wastes generated by lead-based paint hazard reduction activities may be regulated as ''hazardous wastes'' under RCRA Subtitle C. Wastes may be considered hazardous waste by virtue of being specifically listed as hazardous or by exhibiting a characteristic of hazardous waste. Lead-bearing wastes from lead-based paint activities are not listed wastes. Such wastes, however, may exhibit the hazardous characteristics of toxicity (40 CFR 261.24), corrosivity (40 CFR 261.22), or ignitability (40 CFR 261.21). They are unlikely, due to lead content, to exhibit the other hazardous characteristic of reactivity (that is, be capable of easily generating explosive or toxic gas, especially when mixed with water, or be unstable and undergo violent change without detonating).

Under the toxicity characteristic, wastes or media (e.g., soil) contaminated with wastes are hazardous for lead if, after applying the toxicity characteristic leaching procedure (TCLP) to a sample, the waste produces an extract with a concentration of lead equal to or exceeding 5 milligrams per liter (5 ppm). Corrosive hazardous waste is waste that has a pH less than or equal to 2 (highly acidic) or greater than or equal to 12.5 (highly basic), or that can corrode steel at a certain rate. Unneutralized waste from the use of caustic or acidic paint strippers may be corrosive hazardous waste. Ignitable hazardous waste generally includes liquids with flash points less than 140 °F (60 °C), flammable solids, compressed gases, and oxidizers. Wastes generated by the use of certain solvents for paint stripping may be ignitable hazardous waste.

When promulgated, TSCA section 403 standards will not affect the determination of whether wastes or soil containing lead are hazardous under RCRA. Moreover, there is no direct relationship between the approaches used to identify a TSCA section 403 lead-based paint hazard and a RCRA characteristic hazardous waste. The TSCA section 403 standards are based on an exposure scenario involving the ingestion of lead-contaminated dust or soil by young children. In contrast, the level at which wastes contaminated with lead are considered hazardous under the RCRA toxicity characteristic is based upon an analysis using a scenario involving the consumption of ground water contaminated by waste constituents leaching from a landfill receiving municipal waste.

The potential applicability of RCRA hazardous waste regulations and the associated compliance costs, however, have informed the development of the proposed TSCA section 403 soil-lead hazard standard. As discussed in Unit IV. of this preamble, when developing TSCA regulations, EPA considered both risk reduction and cost in selecting the proposed soil-lead hazard standard. Because the costs of managing excavated lead-contaminated soil as hazardous waste are significantly higher than the cost of managing this material as non-hazardous waste, identifying this material as hazardous waste would approximately double the cost of abatement and was a factor in the selection of the proposed standard.

B. CERCLA Response Actions and RCRA Corrective Actions

Under CERCLA, the Federal government may undertake or compel responsible parties to cleanup hazardous substance releases. Because lead is a CERCLA hazardous substance, these response actions may address lead contamination in soil and other environmental media. Likewise, soil, sediment, or other media contaminated with lead may be considered a RCRA hazardous waste (as described above) and RCRA hazardous waste management facilities undergoing corrective action may be required to remediate such contamination. The CERCLA and RCRA cleanup programs have similar purposes, but address different types of sites: whereas RCRA regulates permitted hazardous waste treatment, storage, and disposal facilities, CERCLA generally governs abandoned or uncontrolled industrial sites (but may also be applied to residential or commercial properties).

To assist the regulators responsible for CERCLA responses and RCRA corrective actions, EPA has developed soil screening levels (SSLs) for various hazardous constituents, including lead. The SSL for lead is 400 ppm, based on risk analysis using the IEUBK model with a residential scenario (Ref. 84). The SSL is not a cleanup standard. It neither triggers the need for response actions nor defines unacceptable levels of soil contamination. Instead, it helps Federal and State regulators identify and define lead-contaminated areas that require further study.

Where soil-lead concentrations at CERCLA sites or RCRA corrective action facilities are below the SSL, no further response action or study of such contamination is generally warranted. Where contaminant concentrations equal or exceed the SSL, however, further investigation, but not necessarily cleanup, is warranted. These further investigations often involve site characterization and the application of the IEUBK model using site-specific data for sites that include residential property. Federal and State regulators use the results of these investigations to determine the need for remediation and, if necessary, to analyze remedial options and establish site-specific preliminary remediation goals (PRGs) at CERCLA sites and at RCRA corrective action facilities.

The TSCA section 403 standards are defined for largely different purposes and audiences. Unlike CERCLA responses and RCRA corrective actions, residential lead hazard reduction activities often occur without government oversight. The TSCA section 403 standards are intended for use by any person involved in identifying and addressing lead-based paint hazards, including homeowners, rental property owners, tenants, contractors, government housing programs, and Federal, State, and local regulators. The proposed TSCA section 403 standards are designed to provide practical advice widely applicable to residential property. Expensive, residence-specific investigations would not be required. Rather, when promulgated, the standards could be used for millions of homes throughout the nation to evaluate properties quickly at modest cost.

In addition, the criteria used to select hazard control methods differ under TSCA section 403, RCRA, and CERCLA. Under CERCLA, for example, preference is given to ''treatment [methods] which permanently and significantly reduce the volume, toxicity or mobility'' of the hazardous constituents regardless of risk (CERCLA section 121(b)). Likewise, under RCRA, hazardous waste must be treated to meet stringent standards prior to land disposal. TSCA does not have any similar preferences for permanent treatment. Furthermore, Title X recognizes the important role of temporary control measures (i.e, interim controls).

In summary, the TSCA section 403 standards should not affect the selection of cleanup remedies at CERCLA response actions or RCRA corrective action facilities. The TSCA section 403 standards are being developed for different purposes and audiences. They will provide generic guidance that can be used at millions of widely varying sites throughout the nation. Owners of properties with lead-based paint hazards should undertake permanent or interim measures to control these hazards. In contrast, the site-specific investigations that occur under CERCLA and RCRA allow risk and cleanup levels to be narrowly tailored to the individual site with a preference for permanent solutions. Thus, the action levels, cleanup goals, and remedies selected at CERCLA and RCRA sites may differ from those being proposed in today's action.

C. Indoor Air Activities

The Indoor Environment Division of EPA's Office of Air and Radiation seeks to reduce indoor air pollution through a variety of educational and other non-regulatory means. The Indoor Air Program incorporates lead-based paint concerns in its outreach to owners and occupants of residential, public, and commercial buildings, even though lead-based paint concerns are not its primary focus and the inhalation of air containing lead-contaminated dust is not the major pathway of childhood lead exposure. The Indoor Air Program will reference and discuss section 403 standards in its efforts to help building owners and occupants properly identify and respond to lead-based paint hazards and other indoor air problems.

X. Public Record and Electronic Submissions

The official record for this proposed rule has been established under docket control number OPPTS–62156 (including comments and data submitted electronically as described below). A public version of this record, including printed, paper versions of electronic comments, which does not include any information claimed as CBI, is available for inspection from 12 noon to 4 p.m., Monday through Friday, excluding legal holidays. The official record is located in the TSCA Nonconfidential Information Center, Rm. NE-B607, 401 M St., SW., Washington, DC. The record now includes:

1. ''Risk Analysis to Support Standards for Lead in Paint, Dust, and Soil,'' Office of Pollution Prevention and Toxics.
2. The economic analysis.
3. Materials related to the Dialogue Process and other public meetings

(contained in Dockets OPPTS-62148, OPPTS-62151, OPPTS-62151A, and OPPTS-62151B).

4. Support documents, reports, and published literature cited in this report, including all the references listed in Unit XI. of this preamble.

5. Published literature and all other references cited in all relevant documents.

Electronic comments can be sent directly to EPA at oppt.ncic@epamail.epa.gov. Electronic comments must be submitted as an ASCII file avoiding the use of special characters and any form of encryption. Comments and data will also be accepted on disks in WordPerfect 5.1/ 6.1 or ASCII file format. All comments and data in electronic form must be identified by the docket control number OPPTS–62156. Electronic comments on this proposed rule may be filed online at many Federal Depository Libraries.

XI. References

1. U.S. Environmental Protection Agency. December 1997. Risk Analysis to Support Standards for Lead in Paint, Dust, and Soil. Volumes I and II. EPA 747-R-97-006.

2. U.S. Centers for Disease Control and Prevention. October 1991. *Preventing Lead Poisoning in Young Children: A Statement by the Centers for Disease Control*.

3. Lepow, M.L., et al. 1975. ''Investigations into Sources of Lead in the Environment of Urban Children.'' *Environmental Research*. 10:415-426.

4. Rabinowitz M., A. Leviton, H. Needleman; D. Bellinger, and C. Waternaux. 1985. ''Environmental correlates of infant blood lead levels in Boston.'' *Environmental Research*. 38(1):96-107.

5. Pirkle, J.L., D.J. Brody, E.W. Gunter, R.A. Kramer, D.C. Paschal, K.M. Flegal, and T.D. Matte. 1994. ''The Decline in Blood Lead Levels in the United States: The National Health and Nutrition Examination Surveys (NHANES).'' *Journal of the American Medical Association*. 272(4):284-291.

6. U.S. Centers for Disease Control and Prevention. February 21, 1997. ''Update: Blood Lead Levels-U.S., 1991-1994.'' *Morbidity and Mortality Weekly Report*. 46(7):141-145.

7. Brody, D.J., J.L. Pirkle, R.A. Kramer, K.M. Flegal, T.D. Matte, E.W. Gutiter, and D.C. Paschal. 1994. ''Blood Lead Levels in the U.S. Population: Phase I of the Third National Health and Nutrition Examination Survey (NHANES III, 1988 to 1991).'' *Journal of the American Medical Association*. 272(4):277-283.

8. U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics. April 1995. *Report on the National Survey of Lead Based Paint in Housing - Base Report*. EPA 747-R-95-003.

9. U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics. April 1995. *Report on the National Survey of Lead Based Paint in Housing - Appendix II: Analysis*. EPA 747-R-95-005.

10. U.S. Environmental Protection Agency. 1994. *Reducing Lead Hazards When Remodeling Your Home*. EPA 747-R-94-002.

11. U.S. Department of Housing and Urban Development. June 1995. *HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

12. U.S. Environmental Protection Agency. Section 403 Dialogue Process Meeting Summary. October 19, 1995.

13. U.S. Environmental Protection Agency. Section 403 Dialogue Process Meeting Summary. December 14, 1995.

14. U.S. Environmental Protection Agency. Section 403 Dialogue Process Meeting Summary. February 15, 1996.

15. U.S. Environmental Protection Agency. Section 403 Dialogue Process Meeting Summary. March 21, 1996.

16. U.S. Environmental Protection Agency. Section 403 Dialogue Process Meeting Summary. November 12, 1997.

17. U.S. Environmental Protection Agency. Meeting Summary for meeting with Lead Industries Association. November 21, 1996.

18. Matlack, William. 1980. *Statistics for Public Policy and Management*. Duxberry Press, pp. 310-338.

19. U.S. Environmental Protection Agency. April 1995. *Report on the National Survey of Lead-Based Paint in Housing. Appendix I: Design and Methodology*. EPA 747-R95-004.

20. U.S. Department of Housing and Urban Development. 1995. *The Relation of Lead-Contaminated House Dust and Blood Lead Levels Among Urban Children. Volumes I and II*. Final report to U.S. HUD from the University of Rochester School of Medicine, Rochester, NY and The National Center for Lead Safe Housing, Columbia, MD.

21. Roels, H.A., J-P Buchet, and R. Lauwerys, et al. 1976. ''Impact of Air Pollution by Lead on the Heme Biosynthetic Pathway in School-age Children.'' *Archives of Environmental Health*. 31:310-316.

22. Piomelli, S., C. Seaman, and D. Zullow, et al. 1982. ''Threshold for Lead Damage to Heme Synthesis in Urban Children.'' *Proceedings of National Academy of Science*. 7:3335-3339.

23. Marcus, A.H. and J. Schwartz. 1987. ''Dose-response Curves for Erythrocyte Protoporphyrin vs Blood Lead: Effects of Iron Status.'' *Environmental Research*. 44:221-227.

24. Rabinowitz, M.B., A. Leviton, and H. Needleman. 1986. ''Occurrence of Elevated Protoporphyrin Levels in Relation to Lead Burden in Infants.'' *Environmental Research*. 39:253-257.

25. Hernberg, S., J. Nickanes, and Mellin, et al. 1970. ''δ-Aminolevulinic Acid Dehydrase as a Measure of Lead Exposure.'' *Archives of Environmental Health*. 21:140-145.

26. Secchi, G.C., L. Alessio, and G. Cambiaghi. 1973. ''Na+/K+-ATPase Activity of Erythrocyte Membranes: in Urban Populations Not Occupationally Exposed to Lead.'' *Archives of Environmental Health*. 27:399-400.

27. Wada, O., K. Takeo, Y. Yano, T. Ono, and M. Nagahashi. 1976. ''Delta-aminolevulinic Acid Dehydratase in Low Level Lead Exposure.'' *Archives of Environmental Health*. July-August. 31(4):211-5.

28. Angle, C.R. and M.S. McIntire. 1978. ''Low Level Lead and Inhibition of Erythrocyte Pyrimidine Nucldeotidase.'' *Environmental Research*. 17:296-302.

29. Valentine, W.N. and D.E. Paglia. 1980. ''Erythrocyte disorders of purine and pyrimidine metabolism.'' *Hemoglobin*. 4(5-6):669-81.

30. Rosen, J. 1995. ''Adverse Health Effects if Lead at Low Exposure Levels; Trends in the Management of Childhood Lead Poisoning.'' *Toxicology*. 97:11-17.

31. Benignus, V.A., D.A. Otto, K.E. Muller, and K.J. Seiple. 1981. ''Effects of Age and Body Lead Burden on CNS Function in Young Children II: EEG Spectrum.'' *Electroencephalography and Clinical Neurophysiology*. 52:240-248.

32. Otto, D.A., V. A. Benignus, K.E. Muller, and C.N. Barton. 1981. ''Effects of Age and Body Lead Burden on CNS Function in Young Children I: Slow Cortical Potentials.'' *Electroencephalography and Clinical Neurophysiology*. 52:229-239.

33. Otto, D., V. Benignus; K. Muller; C. Barton; K. Seiple; J. Prah, and S. Schroeder. 1982. ''Effects of Low to Moderate Lead Exposure on Slow Cortical Potentials in Young Children: Two Year Follow-Up Study.'' *Neurobehavioral Toxicology and Teratology*. November-December. 4(6):733-737.

34. Otto, D., G. Robinson, S. Baumann, S. Schroeder, P. Mushak, D. Kleinbaum, and L. Boone. October 1985. ''5-Year Follow-Up Study of Children with Low-to-Moderate Lead Absorption: Electrophysiological Evaluation.'' *Environmental Research*. 38(1):168-86.

35. Robinson, G.S., S. Baumann, and D. Kleinbaum, et al. 1985. ''Effects of Low to Moderate Lead Exposure on

Brainstem Auditory Evoked Potentials in Children: Environmental Health Document 3.'' Copenhagen, Denmark: WHO Regional Office for Europe. pp. 177-182.

36. Winneke, G. and U. Kraemer. 1984. ''Neuropsychological Effects of Lead in Children: Interactions with Social Background Variables.'' *Neuropsychobiology*. 11:195-202.

37. Baumann, S., D. Otto, G. Robinson, S. Schroeder, and C. Barton. 1987. ''The Relationship of Late Positive ERPs, Age, Intelligence and Lead Absorption in Socioeconomically Disadvantaged Children.'' *Current Trends in Event-Related Potential Research (EEG Supplement)*. 40:617-23.

38. Schwartz, J. and D.A. Otto. 1987. ''Blood Lead, Hearing Thresholds, and Neurobehavioral Development in Children and Youth.'' *Archives of Environmental Health*. 42:153-160.

39. Bellinger, D.C., A. Leviton, and C. Waternaux, et al. 1987a. Longitudinal Analyses of Prenatal and Postnatal Lead Exposure and Early Cognitive Development.'' *New England Journal of Medicine*. 316:1037-1043.

40. Dietrich, K.N., K.M. Kraft, and R. Shukla, et al. 1987b. ''The Neurobehavioral Effects of Early Lead Exposure.'' *Monographs of the American Association of Mental Deficiency*. 8:71-95.

41. Ernhart, C.B., A.W. Wolf, and M.J. Kennard, et al. 1986. ''Intrauterine Exposure to Low Levels of Lead: The Status of the Neonate.'' *Archives of Environmental Health*. 41:287-291.

42. McMichael, A.J., P.A. Baghurst, and N.R. Wigg, et al. 1988. ''Port Pirie Cohort Study: Environmental Exposure to Lead and Children's Abilities at the Age of Four Years.'' *New England Journal of Medicine*. 319:468-476.

43. Fulton, M., G. Raab, G. Thomson, D. Laxen, R. Hunter, and W. Hepburn. 1987. ''Influence of Blood Lead on the Ability and Attainment of Children in Edinburgh.'' *Lancet*. 1:1221-1226.

44. Landsdown, R., W. Yule, and M.A. Urbanowicz, et al. 1986. ''The Relationship Between Blood Lead Concentrations, Intelligence, Attainment and Behavior in a School Population: The Second London Study.'' *International Archives of Occupational Environmental Health*. 57:225-235.

45. Yule, W., R. Landsdown, I. Millar, and M. Urbanowicz. 1981. ''The Relationship Between Blood Lead Concentration, Intelligence, and Attainment in School Population: A Pilot Study.'' *Developments in Medical Child Neurology*. 23:567-576.

46. Schroeder, S.R., B. Hawk, D. Otto, P. Mushak, and R.E. Hicks. 1985. ''Separating the Effect of Lead and Social Factors in IQ.'' *Environmental Research*. 91:178-183.

47. Hawk, B.A., S.R. Schroeder, and G. Robinson, et al. 1986. ''Relation of Lead and Social Factors to IQ of Low-SES Children: A Partial Replication.'' *American Journal of Mental Deficiency*. 91:178-183.

48. Schwartz, J. 1994. ''Low-Level Lead Exposure and Children's IQ: A Meta-Analysis and Search for a Threshold.'' *Environmental Research*. 65:42-55.

49. Schwartz, J., C. Angle, and H. Pitcher. 1986. ''The Relationship Between Childhood Blood Lead and Stature.'' *Pediatrics*. 77:281-288.

50. Bornschein, R. L.; Grote, J.; Mitchell, T., Succop. P. A.; Dietrich, K. N.; Kraft, K. M.; Hammond, P. B. 1989. ''Effects of Prenatal Lead Exposure on Infant Size at Birth.'' In: Smith, M. A.; Grant, L.D.; Sors, A. I., eds. *Lead Exposure and Child Development: An International Assessment*. Lancaster, United Kingdom: Kulwer Academic Publishers.

51. Shukla, R., K.N. Dietrich, R.L. Bornschein, O. Berger, and P.B. Hammond. 1991. ''Lead Exposure and Growth in the Early Preschool Child: A Follow-Up Report from the Cincinnati Lead Study.'' *Pediatrics*. 88(5):886-92.

52. Bhattacharya, A., R. Shukla., R. Bornschein, K. Dietrich, and J.E. Kopke. 1988. ''Postural Disequilibrium Quantification in Children with Chronic Lead Exposure: A Pilot Study.'' *Neurotoxicology*. 9(3):327-40.

53. McMichael, A.J., G.V. Vimpani, and E.F. Robertson, et al. 1986. ''The Port Pirie Cohort Study: Maternal Blood Lead and Pregnancy Outcome.'' *Pediatrics*. 89(4):740-742.

54. Moore, M.R., A. Goldberg, and S. Pocock, et al. 1982. ''Some Studies of Maternal and Infant Lead Exposure in Glasgow.'' *Scotland Medical Journal*. 27:113-122.

55. Pocock, S.J., A.G. Shaper, D. Ashby, T. Delves, and T.P. Whitehead. 1984. ''Blood Lead Concentration, Blood Pressure, and Renal Function.'' *British Medical Journal*. 289(6449):872-4.

56. U.S. Environmental Protection Agency. 1986. *Air Quality Criteria Document for Lead*. Research Triangle Park, NC. Office of Research and Development. EPA 600/8-83-028F.

57. U.S. Environmental Protection Agency. January 1990. *Report of the Clean Air Scientific Advisory Committee on its Review of the OAQPS Lead Staff Paper and the ECAO Air Quality Criteria Document Supplement*. EPA-SAB-CASAC-90-002.

58. U.S. Environmental Protection Agency. 1990. *Air Quality Criteria for Lead: Supplement to 1986 Addendum*. Office of Research and Development. EPA/600-8-89/049F.

59. U.S. EPA, Office of Air Quality Planning and Standards. December 1990. *Review of the National Ambient Air Quality Standards for Lead: Assessment of Scientific and Technical Information*. (OAQPS Staff Paper.) EPA-450/2-89-022.

60. Davis, J.M. and D.J. Svendsgaard. 1987. ''Lead and Child Development.'' *Nature*. 329:297-300.

61. Mushak, P., J.M. Davis, A.F. Crocetti, and L.D. Grant. October 1989. ''Prenatal and Postnatal Effects of Low-Level Lead Exposure: Integrated Summary of a Report to the U.S. Congress on Childhood Lead Poisoning.'' *Environmental Research*. 50(1):11-36.

62. U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry. 1988. *The Nature & Extent of Lead Poisoning in Children in the United States: A Report to Congress*.

63. National Academy of Sciences. 1993. *Measuring Lead Exposure in Infants, Children, and Other Sensitive Populations*.

64. Battelle Memorial Institute. Memorandum to Todd Holderman, U.S. Environmental Protection Agency. September 3, 1997.

65. University of Cincinnati. July 1990. *Midvale Community Lead Study: Final Report*.

66. Lewis and Clark County Health Department, Montana Department of Health and Environmental Sciences, U.S. Department of Health and Human Services, and U.S. Environmental Protection Agency. July 1986. *East Helena, Montana: Child Lead Study, Summer 1983*. Final Report.

67. Hogan K, Elias R, Marcus A, White P. 1995. ''Assessment of the USEPA IEUBK Model Prediction of Elevated Blood Lead Levels.'' *The Toxicologist* 15:36.

68. Bureau of the Census, Department of Housing and Urban Development. February 1995. *American Housing Survey for the United States in 1993*. Current Housing Reports No. H150/93.

69. Salkever, David. 1995. ''Updated Estimates of Earnings Benefits from Reduced Exposure of Children to Environmental Lead,'' *Environmental Research*. 70:1-6.

70. U.S. Department of Commerce. 1993. *Money Income of Households, Families, and Persons in the United States: 1992*, Current Population Reports, Consumer Income, Series P60-184.

71. U.S. Department of Education. 1993. *Digest of Education Statistics*.

72. Wallston, T.S. and R.G. Whitfield. 1986. *Assessing the Risks to Young Children of Three Effects Associated with Elevated Blood-Lead Levels.* Report by Argonne National Laboratory. Report No. ANL/AA-32. Sponsored by the U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards.

73. American Academy of Pediatrics. 1996. ''Treatment Guidelines for Lead Exposure in Children,'' *Pediatrics*, 96(1):55-160.

74. Kakalik, J. et al. 1981. *The Cost of Special Education*. Rand Corporation Report N-1791-ED.

75. Hometech. 1996. Remodeling and Renovation Cost Estimator.

76. Means, R.S. 1996. Repair and Remodeling Cost Data.

77. Santucci, Robert, cost consultant to the National Center for Lead-Safe Housing and president of Urban Restoration Corporation, North Carolina, personal communication with Chris Paciorek, Abt Associates Inc., July 1996.

78. U.S. Department of Commerce, Economics and Statistics Administration and Bureau of the Census and U.S. Department of Housing and Urban Development, Office of Policy Development and Research. 1997. *American Housing Survey for the United States in 1995*.

79. U.S. Department of Housing and Urban Development, Office of Lead-Based Paint Abatement and Poisoning Prevention. 1996. *Regulatory Impact Analysis of the Proposed Rule on Lead-Based Paint: Requirements for Notification, Evaluation and Reduction of Lead-Based Paint Hazards in Federally-Owned Residential Property and Housing Receiving Federal Assistance*. Prepared by ICF Incorporated.

80. Lead-Based Paint Hazard Reduction and Financing Task Force. July 1995. *Putting the Pieces Together: Controlling Lead Hazard in the Nation's Housing.*

81. National Center for Lead-Safe Housing. SpecMaster Database, provided to Chris Paciorek, Abt Associates by Jonathan Wilson, NCLSH, December 1995.

82. National Center for Lead-Safe Housing. Undated. *Creating a Lead-Based Paint Hazard Control Policy: A Practical, Step-by-Step Approach for Nonprofit Housing Organizations.* Technical Assistance Bulletin 2.

83. U.S. Environmental Protection Agency. 1998. *Economic Analysis of TSCA Section 403: Hazard Standards.*

84. U.S. Environmental Protection Agency. July 14, 1994. *Soil Screening Guidance.*

85. Battelle Memorial Institute. Memorandum to Jonathan Jacobson and Todd Holderman, U.S. Environmental Protection Agency. December 10, 1997.

86. Stedman's Medical Dictionary. 1976. William and Wilkin Company, Baltimore. p. 1087.

87. Rabinowitz, M.B. and G.W. Wetherill. 1972. ''Identifying Sources of Lead Contamination by Stable Isotope Techniques.'' *Environmental Science Technology*. 6(8):705-709.

88. Manton, W.I. July-August 1977. ''Sources of Lead in Blood: Identification by Stable Isotopes.'' *Archives of Environmental Health*. 32(4)149-59.

89. Yaffe, Y., C.P. Flessel, J.J. Wesolowski, A. del Rosario, G.N. Guirguis, V. Matias, J.W. Gramlich, W.R. Kelly, T.E. Degarmo, and G.C. Coleman. 1983. ''Identification of lead sources in California children using the stable isotope ratio technique.'' *Arch Environmental Health*. July-August 38(4):237-45.

90. Rabinowitz, M.B. 1987. ''Stable Isotope Mass Spectrometry in Childhood Lead Poisoning.'' *Biological Trace Element Research*. 12:223-229.

91. Clark, C.S., R.L. Bornschein, P. Succop, S.S. Que Hee, P.B. Hammond, and B. Peace. 1985. ''Condition and Type of Housing as an Indicator of Potential Environmental Lead Exposure and Pediatric Blood Lead Levels.'' *Environmental Research*. 38:46-53.

92. Green, T. and C.B. Ernhart. 1991. ''Prenatal and Preschool Age Lead Exposure: Relationship with Size.'' *Neurotoxicology and Teratology*. 13:417-427.

93. Battelle Memorial Institute. Memorandum to Janet Remmers, U.S. Environmental Protection Agency. April 4, 1996.

94. National Center for Lead-Safe Housing. Memorandum to Dave Jacobs and Steve Weitz, U.S. Department of Housing and Urban Development. July 1, 1997.

95. McElvaine, M.D., et al. 1992. ''Prevalence of Radiographic Evidence of Paint Chip Ingestion Among Children with Moderate to Severe Lead Poisoning, St. Louise, Missouri, 1989 through 1990.'' *Pediatrics*. 89(4):740-742.

96. National Center for Lead-Safe Housing. May 1997. Data tables based on November 1996 data for HUD Evaluation of Lead Hazard Control Programs provided to Jonathan Jacobson, U.S. Environmental Protection Agency.

97. National Conference of State Legislatures. August 1997. *Lead Poisoning Prevention. Directory of State Contracts, 1997-1998.*

98. U.S. Environmental Protection Agency. January 31, 1996. *Statistical Evaluation of the Relationship Between Blood Lead and Dust Lead Based on Pre-Intervention Data from R&M Study*. Final Report to U.S. EPA from Battelle, Contract No. 68-D2-0139.

99. U.S. Environmental Protection Agency. February 22, 1996. *Statistical Evaluation of the Relationship Between Blood Lead and Dust Lead Based on Pre-Intervention Data from the Rochester Lead-in-Dust Study*. Final Report to U.S. Environmental Protection Agency from Battelle, Contract No. 68-D2-0139.

100. Bornschein, R.L., P.A. Sucoop, K.M. Kraft, C.S. Clark, B. Peace, and P.B. Hammond. 1987. ''Exterior Surface Dust Lead, Interior House Dust Lead and Childhood Lead Exposure in an Urban Environment.'' In *Trace Substances in Environmental Health. XX. Proceedings of University of Missouri's 20th Annual Conference, June 1996* (D.D. Hemphill, Ed.), pp. 322-332, University of Missouri, Columbia, MO.

101. Lanphear, B.P., M. Emond, D.E. Jacobs, M. Wesetzonan, M. Tanner, N.L. Winter, B. Yakis, and S. Eberly. 1995. ''A Side-by-Side Comparison of Dust Collection Methods for Sampling Lead-Contaminated House Dust.'' *Environmental Research*. 68:114-123.

102. U.S. Environmental Protection Agency. 1998. *Analyses of Pathways of Residential Lead Exposure in Children*. Peer Review Draft. April 27.

103. Dickey, E.C., P.J. Jasa, and D.P. Shelton. 1986. *Estimating Residue Cover*. NebGuide G86-793. University of Nebraska, Institute of Agriculture and Natural Resources.

104. Connor, Patrick, Connor Environmental Services, personal communication with Jonathan Jacobson, U.S. Environmental Protection Agency. August 15, 1996.

105. U.S. Environmental Protection Agency. December 3, 1997. *Analysis of Lead Dust Clearance Testing*. Peer Review Draft.

106. Mielke, H.W. 1994. ''Lead in New Orleans Soils: New Images of an Urban Environment.'' *Environmental Geochemistry and Health*. 16(3-4):123-128.

107. U.S. Environmental Protection Agency. February 1985. *Costs and Benefits of Reducing Lead in Gasoline: Final Regulatory Impact Analysis*. Prepared by U.S. Environmental Protection Agency, Office of Policy Analysis, Economic Analysis Division.

108. U.S. Environmental Protection Agency. December 1986. *Reducing Lead in Drinking Water: A Benefit Analysis*. Prepared by U.S. Environmental Protection Agency, Office of Policy

Planning and Evaluation, Draft Final Report.

XII. Regulatory Assessment Requirements

A. Executive Order 12866

The Agency submitted this proposed action to the Office of Management and Budget (OMB) for review under Executive Order 12866, entitled *Regulatory Planning and Review* (58 FR 51735, October 4, 1993), and any changes made during that review have been documented in the public record. OMB has determined that this proposed action is ''economically significant,'' because this proposed rule may result in behavioral changes that involve increased expenditures by owners of target housing and child-occupied facilities, with a potential annual effect on the economy of $100 million or more. Although the establishment of the standards contained in this proposed rule do not, in and of themselves, mandate any action, the Agency recognizes that the existence of the hazard standards may influence the decisions or actions of owners of target housing.

The Agency believes that, in establishing the standards, it is appropriate to consider the potential costs and benefits associated with the possible actions that an owner could or might take based on the hazard standard. The Agency has therefore prepared an economic analysis which assumes that a risk assessment would be conducted in all target housing at the time a newborn enters the home, that the owners of the target housing would respond to all identified hazards, and that no activities would occur in the absence of the 403 standards.

The Agency recognizes, however, that risk assessments will not be conducted in all target housing, nor will all the owners of target housing respond to all identified hazards. In addition, intervention activities are occurring and will continue to occur, even in the absence of the 403 standards. Consequently, EPA believes that this analysis overestimates the potential costs and benefits associated with the non-mandatory intervention activities related to the establishment of the proposed standards. Furthermore, EPA used other assumptions in the analysis (e.g., the use of a birth trigger for testing and hazard intervention activities, and the use of a 3 percent discount rate), that can potentially affect the relative balance of costs and benefits. These assumptions are summarized below in the discussion of the Agency's sensitivity analyses, which are presented in Chapter 7 of the Agency's economic analysis.

This analysis is contained in a document entitled *Economic Analysis of Proposed Lead Hazard Standards* (Ref. 83), and is available as a part of the public record for this action. The analysis was used by the decision-makers to help in the selection of the hazard standards proposed in this document. The following summary of the economic analysis presents the benefits, costs, and net benefits for those activities that could be potentially related to the establishment of the lead hazard standards (i.e., related to lead-based paint hazard interventions, as well as the costs of conducting risk assessments to evaluate homes for lead-based paint hazards). The Agency presents costs and benefits for paint interventions separately because they did not affect the Agency's evaluations and decisions regarding dust and soil. As discussed in Unit IV. of this preamble, EPA did not use the economic analysis of the paint component of the proposed regulation in selecting the preferred option for the paint standard due to data limitations. EPA presents the costs of conducting risk assessments separately because these costs are the same for all dust and soil standard options and, therefore, did not affect the Agency's decision-making on the standards.

In general, the economic analysis is designed to provide comparisons of different standards, and does not attempt to predict precisely how much remediation of residential lead-based paint hazards will occur as a result of promulgating these standards. The economic analysis compares alternative standard options in terms of their net benefits. Net benefits are based on the benefits of risk reduction minus the costs of control activities needed to achieve the reduction in risk. The benefit categories all measure health effects resulting from childhood lead exposure. The analysis calculates net benefits for a wide range of alternative standards, including the proposed section 403 hazard levels.

The total costs (estimated over a 50-year span, and discounted at 3 percent) for setting the proposed dust and soil standards, which are based on the proposed standard of 50 µg/ft² for floor dust, 250 µg/ft² for window sill dust and 2,000 ppm for soil, are estimated to be $19 billion, while the total estimated benefits are $108 billion using the IEUBK model and $39 billion using the empirical model, resulting in estimated net benefits of $89 billion using the IEUBK model and $19 billion using the empirical model. For paint interventions, the estimated total cost is $20 billion, with total estimated benefits of $59 billion using the IEUBK model and $5 billion using the empirical model, resulting in estimated net benefits of $39 billion using the IEUBK model and -$15 billion using the empirical model. The total estimated costs for testing are $14 billion, and the Agency did not estimate any benefits for potential testing activities. About 25.4 million homes are projected to exceed one or more of the standards, and the Agency projected approximately 43.8 million children would experience reduced exposure to household lead in soil, dust, and paint.

1. *Dust and soil analysis*. The monetized benefits estimated over the 50-year modeling period for the proposed TSCA section 403 standards of 50 µg/ft² floor dust, 250 µg/ft² window sill dust, and 2,000 ppm soil are $39 billion from the empirical model and $108 billion from the IEUBK model. These estimates are based on the following assumptions: that all owners of target housing will conduct a risk assessment to identify lead hazards at the time when a newborn child enters the home; that these owners will respond to all identified lead hazards; and that no intervention activities will occur in the absence of the 403 standards.

As would be expected, alternative dust and soil standards that are more stringent than these are estimated to produce additional benefits. Changes in stringency affect the benefits differently depending upon the model used. For the empirical model, benefits fall within a fairly tight range of $30 to $47 billion, when options range from 1,000 to 5,000 ppm for soil, from 50 to 200 µg/ft² for floor dust, and 100 to 500 µg/ft² for window sill dust. For the IEUBK model, the range of benefits over these alternative options is wider, from approximately $73 billion to $150 billion.

The costs for the proposed TSCA section 403 standards of 50 µg/ft² floor dust, 250 µg/ft² window sill dust, and 2,000 ppm soil (estimated over the 50-year modeling period and discounted at 3 percent) are $19 billion. This represents the costs of interventions to reduce soil and dust-lead levels in response to these standards. EPA estimates costs independently of the two models (i.e., IEUBK, empirical). Costs, therefore, are the same for both analytical approaches. Alternative dust and soil options that are more stringent than the proposed standards are estimated to have higher costs. Changes in stringency ranging from 1,000 to 5,000 ppm for soil, 40 to 200 µg/ft² for floor dust, and 100 to 500 µg/ft² for window sill dust, produce a range of costs from about $12 billion to about $38 billion.

The net benefits of the proposed TSCA section 403 standards for dust and soil are shown in Table 12 below. Net benefits have been used to evaluate alternative lead hazard levels. The estimated net benefits for the proposed standards of 50 µg/ft² for floor dust, 250 µg/ft² for window sill dust, and 2,000 ppm for soil are $19 billion (using the empirical model for blood lead) or $89 billion (using the IEUBK model).

Table 12 also provides an indication of the net benefits corresponding to a range of options for the proposed lead hazard standards. Using the empirical model, the net benefits appear to be near the maximum at 2,000 ppm and 5,000 ppm. At the same time, net benefits decrease (in fact become negative) with more stringent soil options under the empirical model.

Table 12.—Net Benefits from Hazard Options Varying around the Proposed Standard: Point Estimates and Ranges*

	Hazard Standard			Net Benefits ($Billions)	
	Floor Dust (µg/ft²)	Window Sill Dust (µg/ft²)	Soil (ppm)	IEUBK Model	Empirical Model
Range of Soil Options	50	250	500	143	5
	50	250	2,000	89	19
	50	250	5,000	61	21
Range of Floor Dust Options	50	250	2,000	89	19
	100	250	2,000	77	19
Range of Sill Dust Options	50	100	2,000	N/A	16
	50	250	2,000	N/A	19
	50	500	2,000	N/A	19

*Net Benefits do not include the costs and benefits of paint interventions, nor testing costs. The models paint intervention costs (over 50 years discounted at 3 percent) are $20 billion. Paint intervention benefits (over 50 years discounted at 3 percent) are $59 billion with the IEUBK Model and $5 billion with the empirical model. Testing costs (over 50 years discounted at 3 percent) are approximately $14 billion. As explained in Unit IV. of this preamble, the net benefit estimates generated by the IEUBK model-based approach and the empirical model-based approach are not comparable.

The IEUBK model, on the other hand, suggests that maximum net benefits occur at more stringent options, and decline with less stringent ones. Net benefits do not vary substantially under either model across the range of dust options evaluated.

Given overall modeling uncertainties, and the fact that both models suggest that net benefits are positive in the 2,000 ppm soil range, the proposed soil and dust standards appear to provide a reasonable combination of national values that will tend to maximize the net benefits of performing interventions to protect children from exposure to lead from these sources. In addition to the relative net benefits, each hazard standard was evaluated in terms of number of children protected. Under the proposed option, it is estimated that the number of children with blood-lead concentrations equal to or exceeding 10 µg/dl would decline by 2 to 6 million over 50 years and the number of children with blood-lead concentrations equal to or exceeding 20 µg/dl would decline by 300,000 to 700,000 in the same timeframe (estimated by the empirical-model based analysis and the IEUBK-model based analysis respectively) (Ref. 83).

2. *Paint analysis*. EPA used the available data on deterioration from the HUD National Survey to estimate costs and benefits associated with repairing or abating deteriorated paint. The Survey reports only the total deterioration in each residence, whereas the proposed hazard standard for paint is based on the amount of deterioration per component in a residence. Because of this difference, as noted in Unit IV. of this preamble, the Agency was unable to use this analysis in selecting a preferred option. In summary, the empirical model-based analysis estimates benefits of $5 billion and the IEUBK model-based analysis estimates benefits of $59 billion. The costs for paint interventions are estimated to be $20 billion yielding net benefits for paint of $-15 billion using the empirical model-based analysis and $39 billion using the IEUBK model-based analysis. For the following reasons, however, the reliability and usefulness of these estimates for characterizing the economic impacts of the proposed standard for deteriorated lead-based paint is significantly limited due to differences in approach and data used. It is also inappropriate to compare the results of each analytical approach.

First, as previously noted, the determination of where paint interventions occur is based on the HUD National Survey, which reports deterioration for an entire residence. The proposed standard, however, is based on the amount of deterioration per component. There is no way to relate the two measurements.

Second, the lack of data to relate quantitatively deteriorated paint to blood-lead concentration limits EPA's ability to measure benefits associated with direct ingestion of lead-based paint. Both modeling approaches (i.e., IEUBK-based and empirical-based) predict benefits based only on the presence or absence of deteriorated paint. Thus, each model's estimate of benefits remains unchanged regardless of the amount of deterioration present.

Third, under the empirical model-based analysis, only interior paint abatement, which is accompanied by dust cleaning, yields dust-related benefits. The analysis does not predict any dust-related benefit for interior paint repair or exterior paint repair or abatement. As discussed in Chapter 4 of the Agency's risk analysis, EPA used data from several abatement studies to estimate the impact of dust cleaning on dust-lead loading when sources of dust-lead contamination were abated. In contrast, the Agency has no basis for estimating the impact of source control alone on dust-lead loading. It is likely, however, that other paint interventions would reduce dust-lead loading. Thus, the empirical model-based analysis probably underestimates the dust-related benefits of paint intervention.

3. *Testing costs*. EPA estimates that the costs of conducting risk assessment to test target housing for the presence of lead-based paint hazards is $14 billion. The analysis assumes that each target housing unit will be tested at the time a newborn enters the home. Testing costs are the same for all hazard standard options. Likewise, the testing costs cannot be assigned to one medium or another because testing costs assume that each of the three media (paint, dust, and soil) are addressed.

4. *Sensitivity and uncertainty analyses*. The economic analysis addresses the robustness of results by reporting model outcomes when each of several different parameters or assumptions are changed. The parameters considered are the discount rate and the value of an IQ point. In addition, the assumption that avoiding small losses of IQ (i.e., less than one point) provides an economic benefit was examined. The first parameter analyzed is discount rate. In the base model, a rate of 3 percent is used. In the sensitivity analysis, 7 percent is used because this is the value recommended in the January 11, 1996 OMB Guidance entitled *Economic Analysis of Federal Regulations Under Executive Order No. 12866*. When the discount rate is 7 percent, model results at each possible standard option change from the base model in the following way: costs decrease, benefits decrease substantially more, and net benefits decrease. Following from these changes, the options at which net benefit would be maximized are less stringent in a 7 percent discount regime than in a 3 percent discount regime. Benefits decrease more than costs because they would be realized over a much longer time horizon, the economically productive lifetime of affected individuals. Costs for actions to protect a given individual would be incurred before the sixth birthday.

The second parameter tested is the value of an IQ point. The base model uses an IQ point value of $8,346, based on recently published analyses (Ref. 69). As an alternative, benefits were calculated using an IQ point value of $6,847, from earlier EPA analyses (Refs. 109 and 110). The total cost calculated would be the same under each assumption, because this parameter does not affect costs. The benefits and net benefits, however, for all options would be lower when the alternative, smaller IQ value is used, because over 95 percent of total benefits are due to changes in IQ. The effect on benefits is small enough, however, that there is no effect on which the standard would maximize net benefits in the IEUBK model, and the empirical model-based analysis predicts only a small decrease of stringency of the window sill dust standard. Thus, the choice of standard is not sensitive to the use of this revised value of an IQ point.

The third issue EPA examined in the sensitivity analysis was the effect of the value of small IQ point differences. The Agency's analysis assumes that a difference in average blood-lead levels between two populations, no matter how small that difference is and regardless of the magnitude of blood-lead levels involved, is associated with a corresponding difference in average IQ scores. In the cost-benefit analysis performed for these standards, the Agency is essentially comparing the blood-lead distributions that would occur between two populations: one with the TSCA section 403 standards versus one without the 403 standards. Furthermore, the analysis relies on the empirical finding that a difference in average IQ scores between two populations, again no matter how small, is associated with a difference in average lifetime earnings. Note that it is not possible to say that for any pair of individuals that a difference in blood-lead will necessarily reflect a difference in IQ scores or lifetime earnings. The available research, however, does demonstrate that such differences do occur on the average for groups of individuals.

Notwithstanding the fact that the risk assessment and benefit-cost analysis were constrained to address population average changes, it was recognized that there might be an interest in considering the contribution to those population average changes made by subgroups in the population whose particular blood-lead and IQ point improvements might be considered small. An analysis was therefore performed and presented in section 7.3.1 of the Economic Analysis to try to characterize the portion of the total benefits from IQ improvements that were contributed by that portion of the population having improvements of less than 1 IQ point. The computational considerations involved in doing that analysis were discussed in detail there. That special analysis showed that, at the proposed standards (window sill dust at 250 $\mu g/ft^2$; floor dust at 50 $\mu g/ft^2$; soil at 2,000 ppm), the contribution of these small IQ point improvements in the population, contributed 30 percent of the value of the IQ point benefits under the IEUBK model and 90 percent of the IQ point benefits under the empirical model.

The Agency, however, recognizes that the methodology used for this sensitivity analysis is preliminary in nature and should not be relied upon for decision-making purposes. More importantly, the Agency is not aware of any technical basis or rationale for not including the benefits associated with small IQ changes.

B. Regulatory Flexibility Act (RFA)

Pursuant to section 605(b) of the Regulatory Flexibility Act (5 U.S.C. 601 *et seq*.), the Agency hereby certifies that this proposed action will not have a significant economic impact on a substantial number of small entities. As previously discussed, this proposed rule does not, in and of itself, mandate any action, or directly impose any costs. The Agency does, however, recognize that the existence of the hazard standards may influence the decisions or actions of owners of target housing, and has therefore considered the potential costs and benefits associated with the possible actions that an owner could or might take based on the hazard standard. The Agency also involved potentially affected entities, including representatives of small businesses (e.g., owners of multi-housing and rental properties), and State/Tribal and local governmental agencies, in an extensive ‘‘dialogue’’ process, which is discussed in more detail in Unit II. of this preamble, as well as other mechanisms of communication.

In addition, although other regulations implementing other sections of Title X will use or reference the hazard standards that are proposed in this document, the impacts of those regulations on small entities are evaluated in the context of those regulations. To date, EPA has promulgated regulations under sections 402, 404, 406, and 1018. For each of these regulations, EPA evaluated the potential impacts on small entities in compliance with the RFA.

Information relating to this determination will be provided to the Chief Counsel for Advocacy of the Small Business Administration upon request, and is included in the docket for this proposal. Any comments regarding the economic impacts that this proposed regulatory action may impose on small entities should be submitted to the Agency at the address listed above.

C. Unfunded Mandates Reform Act (UMRA) and Executive Order 12875

Although the requirements of Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) (Pub. L. 104-4) and Executive Order 12875, *Enhancing the Intergovernmental Partnership* (58 FR 58093, October 28, 1993), do not apply to this proposed rule, the Agency believes that its consideration of the potential costs and benefits of those non-mandatory activities that could be potentially related to the establishment of the lead hazard standards, i.e., activities related to lead-based paint hazard interventions and risk assessments, as well as its discussions with State and Tribal governments, address these requirements. The UMRA requirements in sections 202 and 205 do not apply to this proposed rule, because this action does not contain any ''Federal mandates'' or impose any ''enforceable duty'' on State/Tribal, or local governments or on the private sector. The requirements in section 203 do not apply because this proposed rule does not contain any regulatory requirements that might significantly or uniquely affect small governments. In addition, since this is not a discretionary act containing an unfunded mandate, no consultation is required under the Executive Order.

Nevertheless, the Agency recognizes that the existence of the hazard standards may influence the decisions or actions regarding the intervention activities undertaken by State/Tribal or local governments as potential owners of child-occupied facilities, even if those actions are not mandated by this or any other EPA regulation. The Agency therefore believes that it is important to consider the potential impacts of this proposed rule on State/Tribal or local governments. It is, of course, difficult to predict whether or what intervention activities might be undertaken by State/Tribal or local governments as a result of the establishment or existence of the proposed hazard standards, but the Agency does not believe that the analysis needs to differentiate between ownership in considering the potential costs related to the possible intervention activities. Therefore, since the Agency considered the potential costs and benefits associated with possible intervention activities in selecting the proposed hazard standards, the Agency has also considered the potential costs that might be experienced by State/Tribal or local governments. Intervention activities in child-occupied facilities, because a much larger number of children are involved, will naturally result in greater benefits, increasing the ratio between costs and benefits significantly.

D. Paperwork Reduction Act (PRA)

This proposed regulatory action does not contain any information collection requirements that require additional approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act (PRA), 44 U.S.C. 3501 *et seq.* Specifically, States and Tribes with authorized programs under 40 CFR part 745, subpart L will still need to demonstrate their standards for identifying lead-based paint hazards and soil-lead level of concern, and clearance standards for dust, in the reports that they submit to EPA under 40 CFR 745.324(h). This reporting requirement is contained in the regulations implementing TSCA sections 402(a) and 404, for which the Information Collection Request (ICR) has already been approved by OMB under control number 2070–0155 (EPA ICR No. 1715). As a part of the economic analysis, EPA also re-examined this ICR and determined that the burden estimates provided in the ICR would not change as a result of the promulgation of the standards proposed. Because there are no new information collection requirements to consider, or any changes to the existing requirements that might impact the existing burden estimates, additional OMB review and approval under the PRA is not necessary.

Under the PRA, ''burden'' means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

An Agency may not conduct or sponsor, and a person is not required to respond to a collection of information subject to OMB approval under the PRA unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations, after initial publication in the **Federal Register**, are maintained in a list at 40 CFR part 9.

Comments are requested on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques. Send comments on the ICR to EPA at the address provided in the ''ADDRESSES'' section, with a copy to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th St., NW., Washington, DC 20503, marked ''Attention: Desk Officer for EPA.'' Please remember to include the ICR number in any correspondence. The final rule will respond to any comments on the information collection requirements contained in this proposal.

E. Executive Order 12898

Pursuant to Executive Order 12898, entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 7629, February 16, 1994), the Agency has considered environmental justice-related issues with regard to the potential impacts of this proposed action on the environmental and health conditions in low-income and minority communities. The Agency's analysis found that non-white households are more likely to live in housing with lead-based paint hazards, and their children are expected to realize greater reductions in blood-lead levels if these hazards are mitigated. As a result, non-white households are expected to bear more of the costs of responding to the section 403 standards but also receive more of the benefits. Lower- and upper-income households face roughly the same response costs and are expected to receive the same blood-lead reductions. Lower-income households would have to forego a larger share of their income to respond to the section 403 standards (Ref. 83).

F. Executive Order 13045

This proposed rule is subject to Executive Order 13045, entitled *Protection of Children from Environmental Health Risks and Safety Risks* (62 FR 19885, April 23, 1997), because OMB has determined that this is an economically significant regulatory action as defined by Executive Order 12866 (see section A. of this unit), and the Agency has reason to believe that the environmental health or safety risk addressed by this action may have a disproportionate affect on children. In accordance with section 5(501) of Executive Order 13045, the Agency has evaluated the environmental health or safety effects of lead-based paint on children in the selection of the hazard standards contained in this proposed rule. The results of this evaluation are contained in the ''Risk Analysis to Support Standards for Lead in Paint, Dust and Soil'' (Ref. 1), which is summarized and discussed in Unit IV. of this preamble; a copy has been placed in the docket for this action. Futhermore, the proposed regulation would help to prevent lead poisoning among young children by supporting the implementation of the national lead program. Because exposure to lead in paint, dust, and soil is mostly limited to children under the age of 6, young children are, in fact, the primary beneficiaries of this proposed rule, as well as the program.

G. National Technology Transfer and Advancement Act

This proposed regulatory action does not involve any technical standards that would require Agency consideration of voluntary consensus standards pursuant to section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Pub. L. 104-113, section 12(d) (15 U.S.C. 272 note). Section 12(d) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, business practices, etc.) that are developed or adopted by voluntary consensus standards bodies. The NTTAA requires EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards. EPA invites public comment on this conclusion.

List of Subjects in Part 745

Environmental protection, Hazardous substances, Lead-based paint, Lead poisoning, Reporting and recordkeeping requirements.

Dated: May 26, 1998.

Carol M. Browner,

Administrator.

Therefore, it is proposed that 40 CFR part 745 be amended as follows:

PART 745—[AMENDED]

1. The authority citation for part 745 continues to read as follows:

Authority: 15 U.S.C. 2605, 2607, 2615, 2681-2692 and U.S.C. 4852d.

2. By adding new subpart D to read as follows:

Subpart D—Lead-Based Paint Hazards

Sec.

Subpart D—Lead-Based Paint Hazards

§ 745.61 Scope and applicability.

(a) This subpart identifies lead-based paint hazards.

(b) The standards for lead-based paint hazards apply to target housing and child-occupied facilities.

(c) Nothing in this subpart requires any person to evaluate the property(ies) for the presence of lead-based paint hazards or to take any action to control these conditions if one or more of them is identified.

§ 745.63 Definitions.

The following definitions apply to this subpart.

Arithmetic mean means the algebraic sum of data values divided by the number of data values (e.g., the sum of the concentration of lead in several soil samples divided by the number of samples).

Certified risk assessor means an individual who has been trained by an accredited training program, as defined by § 745.223, and certified by EPA pursuant to § 745.226 or by an authorized State or Tribal program to conduct risk assessments. A certified risk assessor also samples for the presence of lead in dust and soil for the purposes of abatement clearance testing.

Child-occupied facility means a building, or portion of a building, constructed prior to 1978, visited regularly by the same child, 6 years of age or under, on at least two different days within any week (Sunday through Saturday period), provided that each day's visit lasts at least 3 hours and the combined weekly visit lasts at least 6 hours, and the combined annual visits last at least 60 hours. Child-occupied facilities may include, but are not limited to, day-care centers, preschools, and kindergarten classrooms.

Deteriorated paint means paint that is cracking, flaking, chipping, peeling, or otherwise separating from the substrate of a building component.

Interior window sill means the portion of the horizontal window ledge that protrudes into the interior of the room.

Lead-based paint means paint or other surface coatings that contain lead equal to or exceeding 1.0 milligram per square centimeter or 0.5 percent by weight.

Lead-based paint hazard means hazardous lead-based paint, a dust-lead hazard, or a soil-lead hazard as described in § 745.65.

Paint in poor condition means more than 10 square feet of deteriorated paint on exterior components with large surface areas; or more than 2 square feet of deteriorated paint on interior components with large surface areas (e.g., walls, ceilings, floors, doors); or more than 10 percent of the total surface area of the component is deteriorated on interior or exterior components with small surface areas (e.g., window sills, baseboards, soffits, trim).

Risk assessment means an on-site investigation to determine the existence, nature, severity, and location of lead-based paint hazards, and the provision of a report by the individual or the firm conducting the risk assessment, explaining the results of the investigation and options for reducing lead-based paint hazards.

Target housing means any housing constructed prior to 1978, except housing for the elderly or persons with disabilities (unless any one or more children age 6 years or under resides or is expected to reside in such housing for the elderly or persons with disabilities) or any 0-bedroom dwelling.

Weighted arithmetic mean means the arithmetic mean of sample results weighted by the number of subsamples in each sample. Its purpose is to give influence to a sample relative to the number of subsamples it contains. A single surface sample is comprised of a single subsample. A composite sample may contain from two to four subsamples. The weighted arithmetic mean is obtained by summing for all samples, the product of the sample's result multiplied by the number of subsamples in the sample, and dividing the sum by the total number of subsamples contained in all samples. For example, the weighted arithmetic mean of a single surface sample containing 60 $\mu g/ft^2$, a composite sample (3 subsamples) containing 100 $\mu g/ft^2$, and a composite sample (4 subsamples) containing 110 $\mu g/ft^2$ is 100 $\mu g/ft^2$. This result is based on the equation [60+(3*100)+(4*110)]/8.

Wipe sample means a sample collected by wiping a representative surface of known area with an acceptable wipe material (e.g., moist towelette).

§ 745.65 Lead-based paint hazards.

(a) *Hazardous lead-based paint.* Hazardous lead-based paint is lead-based paint in poor condition.

(b) *Dust-lead hazard.* A dust-lead hazard is dust that contains lead equal to or exceeding 50 $\mu g/ft^2$ on uncarpeted floors or 250 $\mu g/ft^2$ on interior window sills based on wipe samples.

(c) *Soil-lead hazard.* A soil-lead hazard is bare soil that contains total lead equal to or exceeding 2,000 parts per million.

§ 745.69 Determining whether lead-based paint hazards or a soil-lead level of concern are present.

(a) *Applicability.* This section applies to the following:

(1) Determining whether hazardous lead-based paint is present.

(2) Determining whether a dust-lead hazard is present on:

(i) Uncarpeted floors.

(ii) Interior window sills.

(3) Determining whether a soil-lead hazard is present.

(b) *Work practice standards.* Determinations of the presence of lead-based paint hazards or a soil-lead level of concern must be made by a certified risk assessor conducting a risk assessment according to the applicable work practice standards at § 745.227(d) and (h).

(c) *Use of standards.* (1) To determine whether a dust-lead hazard is present, a certified risk assessor must compare the weighted arithmetic means of uncarpeted floor dust samples and interior window sill samples to the applicable standards in § 745.65.

(2) To determine whether a soil-lead hazard is present, a certified risk assessor must compare the arithmetic mean of soil samples to the applicable standard in § 745.65.

3. In § 745.223, by alphabetically adding the following definitions to read as follows:

§ 745.223 Definitions.

* * * * *

Arithmetic mean means the algebraic sum of data values divided by the number of data values (e.g., the sum of the concentration of lead in several soil samples divided by the number of samples).

* * * * *

Common area group means a group of common areas that are similar in design, construction, and function. Common area groups include, but are not limited to hallways, stairwells, and laundry rooms.

* * * * *

Concentration means the relative content of a specific substance contained within a larger mass, such as the amount of lead (in micrograms per gram or parts per million by weight) in a sample of dust or soil.

* * * * *

Dripline means the area within 3 feet surrounding the perimeter of a building.

* * * * *

Interior window sill means the portion of the horizontal window ledge that protrudes into the interior of the room.

* * * * *

Loading means the quantity of a specific substance present per unit of surface area, such as the amount of lead in micrograms contained in the dust collected from a certain surface area divided by the surface area in square feet or square meters.

* * * * *

Mid-yard means an area of a residential yard approximately midway between the outermost edge of the dripline of a residential building and the nearest property boundary or between the outermost edges of the driplines of a residential building and another building on the same property.

* * * * *

Residential building means a building containing one or more residential dwellings.

* * * * *

Weighted arithmetic mean means the arithmetic mean of sample results weighted by the number of subsamples in each sample. Its purpose is to give influence to a sample relative to the number of subsamples it contains. A single surface sample is comprised of a single subsample. A composite sample may contain from two to four subsamples. The weighted arithmetic mean is obtained by summing for all samples, the product of the sample's result multiplied by the number of subsamples in the sample, and dividing the sum by the total number of subsamples contained in all samples. For example, the weighted arithmetic mean of a single surface sample containing 60 $\mu g/ft^2$, a composite sample (3 subsamples) containing 100 $\mu g/ft^2$, and a composite sample (4 subsamples) containing 110 $\mu g/ft^2$ is 100 $\mu g/ft^2$. This result is based on the equation [60+(3*100)+(4*110)]/8.

Window trough means, for a typical double-hung window, the portion of the exterior window sill between the interior window well (or stool) and the frame of the storm window. If there is no storm window, the window trough is the area that receives both the upper and lower window sashes when they are both lowered. The window trough is sometimes referred to inaccurately as the window ''well.''

Wipe sample means a sample collected by wiping a representative surface of known area with an acceptable wipe material (e.g., moist towelette).

4. In § 745.227, by revising paragraphs (d)(4), (d)(5), (d)(6) introductory text, (d)(7), (d)(8)(i), (e)(7)(i), (e)(8)(v)(A), (e)(8)(v)(B), and (e)(8)(vii), by redesignating paragraphs (d)(11) as paragraph (d)(12) and paragraph (h) as paragraph (i), and by adding paragraphs (d)(11), (e)(8)(viii) and (h) to read as follows:

§ 745.227 Work practice standards for conducting lead-based paint activities: target housing and child-occupied facilities.

* * * * *

(d) * * *

(4) Each surface with deteriorated paint, which is determined, using documented methodologies, to be in poor condition and to have a distinct painting history shall be tested for the presence of lead. Each interior window sill determined, using documented methodologies, to have a distinct painting history, shall also be tested for the presence of lead in paint.

(5) In residential dwellings, dust samples (either composite or single-surface samples) from the interior window sill(s) and floor shall be collected in all living areas where one or more children, age 6 and under, are most likely to come into contact with dust.

(6) For multi-family dwellings and child-occupied facilities, the samples required in paragraph (d)(4) of this section shall be taken. In addition, interior window sill and floor dust samples (either composite or single-surface samples) shall be collected in the following locations:

* * * * *

(7) For child-occupied facilities, interior window sill and floor dust samples (either composite or single-surface samples) shall be collected in each room, hallway, or stairwell utilized by one or more children, age 6 and under, and in other common areas in the child-occupied facility where the certified risk assessor determines one or more children, age 6 and under, are likely to come into contact with dust.

(8) * * *

(i) Mid-yard areas where bare soil is present; and

* * * * *

(11) The certified risk assessor shall determine whether lead-based paint hazards are present according to paragraph (h) of this section.

* * * * *

(e) * * *

(7) * * *

(i) If the soil is removed: (A) The soil shall be replaced by soil that has a level of lead less than 400 ppm.

(B) The soil that is removed shall not be used as top soil at another residential property or child-occupied facility.

* * * * *

(8) * * *

(v) * * *

(A) After conducting an abatement with containment between abated and unabated areas, one dust sample shall be taken from one interior window sill and window trough (if available) and one dust sample shall be taken from the floors of no less than four rooms, hallways, or stairwells within the containment area. In addition, one dust sample shall be taken from the floor outside the containment area. If there are less than four rooms, hallways, or stairwells within the containment area, then all rooms, hallways, or stairwells shall be sampled.

(B) After conducting an abatement with no containment, two dust samples shall be taken from no less than four rooms, hallways, or stairwells in the residential dwelling or child-occupied facility. One dust sample shall be taken from one interior window sill and window trough (if available) and one dust sample shall be taken from the floor of each room, hallway, or stairwell selected. If there are less than four rooms, hallways, or stairwells within the residential dwelling or child-occupied facility, then all rooms, hallways, or stairwells shall be sampled.

* * * * *

(vii) The certified inspector or risk assessor shall compare the residual lead level (as determined by the laboratory analysis) from each single surface dust sample with applicable clearance levels for lead in dust on floors, interior window sills, and window troughs or from each composite dust sample with the applicable clearance levels for lead in dust on floors, interior window sills, and window troughs divided by the number of subsamples in the composite sample. If the residual lead level in a single surface dust sample equals or exceeds the applicable clearance level or if the residual lead level in a composite dust sample equals or exceeds the applicable clearance level divided by the number of subsamples in the composite sample, all the components represented by the failed sample shall be recleaned and retested.

(viii) The clearance levels are 50 $\mu g/ft^2$ for uncarpeted floors, 250 $\mu g/ft^2$ for interior window sills, and 800 $\mu g/ft^2$ for window troughs.

* * * * *

(h) *Determinations.* (1) Hazardous lead-based paint is present on:

(i) All components that have paint in poor condition and that are determined to contain lead-based paint.

(ii) All components that have paint in poor condition and that are similar to and have a similar painting history to a tested component that contains lead-based paint.

(2) A dust-lead hazard is present on:

(i) Uncarpeted floors and interior window sills when the weighted arithmetic mean lead loading for all single surface or composite samples of uncarpeted floors and interior window sills are equal to or greater than 50 $\mu g/ft^2$ for uncarpeted floors and 250 $\mu g/ft^2$ for interior window sills;

(ii) Uncarpeted floors or interior window sills in an unsampled residential dwelling unit in a multi-family dwelling, if a dust-lead hazard is present on uncarpeted floors or interior window sills, respectively, in at least one sampled residential unit on the property.

(iii) uncarpeted floors or interior window sills in an unsampled common area in a multi-family dwelling, if a dust-lead hazard is present on uncarpeted floors or interior window sills, respectively, in at least one sampled common area in the same common area group on the property.

(3) A soil-lead hazard is present when the arithmetic mean lead concentration from a composite sample (or arithmetic mean of composite samples) from the dripline and a composite sample (or arithmetic mean of composite samples) from the mid-yard for each residential building on a property is equal to or greater than 2,000 parts per million.

5. In § 745.325, by revising paragraphs (d)(2)(iii), by redesignating (d)(2)(iv) and (d)(2)(v) as (d)(2)(v) and (d)(2)(vi), respectively, and by adding paragraphs (d)(2)(iv) and (e), to read as follows:

§ 745.325 Lead-based paint activities: State and Tribal program requirements.

* * * * *

(d) * * *

(2) * * *

(iii) Risk assessments consist of at least:

(A) An assessment, including a visual inspection, of the physical characteristics of the residential dwelling or child-occupied facility;

(B) Environmental sampling for lead in paint, dust, and soil;

(C) Environmental sampling requirements for lead in paint, dust, and soil that allow for comparison to the lead-based paint hazard standards established or revised by the State or Indian Tribe pursuant to paragraph (e) of this section; and

(D) A determination of the presence of lead-based paint hazards made by comparing the results of visual inspection and environmental sampling to the lead-based paint hazard standards established or revised by the State or Indian Tribe pursuant to paragraph (e) of this section.

(iv) The program elements required in § 745.325(d)(2)(iii)(C) and (D) shall be adopted in accordance with the schedule for the demonstration required in paragraph (e) of this section.

(v) * * *

* * * * *

(e) The State or Indian Tribe must demonstrate that it has lead-based paint hazards standards, and clearance standards for dust, that are at least as protective as the standards in § 745.227 as amended on [Insert date of promulgation of the final rule]. A State or Indian Tribe with such a section 402 program approved before [Insert date 2 years following date of promulgation of the final rule] shall make this demonstration no later than the first report submitted pursuant to § 745.324(h) after [Insert date 2 years following date of promulgation of the final rule]. A State or Indian Tribe with such a program submitted but not approved before [Insert date 2 years following date of promulgation of the final rule] may make this demonstration by amending its application or in its first report submitted pursuant to § 745.324(h). A State or Indian Tribe submitting its program on or after [Insert date 2 years following date of promulgation of the final rule] shall make this demonstration in its application.

[FR Doc. 98–14736 Filed 6–2–98; 8:45 am]

BILLING CODE 6560–50–F