

**DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT**

**[Docket No. FR-5700-N-12]**

**Notice of Funding Availability (NOFA) for HUD's Fiscal Year (FY) 2013**

**Healthy Homes Technical Studies Program**

**OVERVIEW INFORMATION**

**A. Federal Agency Name:** Department of Housing and Urban Development, Office of Healthy Homes and Lead Hazard Control.

**B. Funding Opportunity Title:** Healthy Homes Technical Studies.

**C. Announcement Type:** Initial announcement.

**D. Funding Opportunity Number:** FR-5700-N-12, OMB Approval Number is 2539-0015.

**E. Catalog of Federal Domestic Assistance (CFDA) Numbers:** 14.906, Healthy Homes Technical Studies Grant Program.

**Dates:** The application deadline is 11:59:59 eastern time on **March 19, 2013**. Applications must be received and validated by [Grants.gov](http://Grants.gov) no later than 11:59:59 pm eastern time on the application deadline date. Applicants need to be aware that following receipt, applications go through a validation process in which the application may be accepted or rejected. Please allow time for this process to ensure that you meet the timely receipt requirements. Please see the 2013 **General Section** for instructions for timely receipt, including actions to take if the application is rejected. Applicants should carefully read the section titled "APPLICATION and SUBMISSION INFORMATION" in the 2013 **General Section**, posted to [www.Grants.gov](http://www.Grants.gov). This section contains information on using Adobe Reader, HUD's timely receipt policies, and other application information. *HUD will issue a technical correction to this NOFA if appropriations are enacted that require HUD to modify the funding criteria or application requirements, or if HUD determines that adjustments to estimated award amounts or timelines are necessary. Any such technical correction will provide detailed instructions for applicants to permit them to resubmit the application to address the revised NOFA requirements.*

**FOR FURTHER INFORMATION CONTACT:** Questions regarding specific program requirements should be directed to the agency contact identified in this program NOFA. Questions regarding the **General Section** should be directed to the Office of Strategic Planning and Management, Grants Management Division at 202-708-0667 (this is not a toll-free number). Persons with hearing or speech impairments may access this number via TTY by calling the Federal Relay Service at 800-877-8339.

## **Additional Information:**

1. **Purpose:** To fund technical studies to improve existing methods for detecting and controlling key housing-related health and safety hazards; to develop new methods to detect and control these hazards; and to improve our knowledge of key housing-related health and safety hazards.
2. **Available Funds:** Subject to enactment of the FY 2013 HUD appropriations, approximately \$X.X million will be available to fund awards under this NOFA. Fiscal Year 2013 funds are authorized under the Department of Housing and Urban Development Appropriations Act, 2013 (Public Law XXX-XXX), approved on XXXX XX, XXXX.
3. **Anticipated Awards:** The maximum amount for a grant award is \$750,000. Subject to enactment of the FY 2013 HUD appropriations, HUD anticipates making approximately X to X awards for the Healthy Homes Technical Studies Program ranging from approximately \$300,000 to a maximum of \$750,000 each.
4. **Type of Awards:** Cooperative agreements, with substantial involvement of the government, will be awarded (see Section II.C for a description of substantial involvement).
5. **Eligible Applicants:** Academic, not-for-profit and for-profit institutions located in the U.S., state and units of local government, and federally recognized Native American tribes are eligible to apply. For-profit firms are not allowed to earn a fee (i.e., make a profit from the project). See Sections III.A.1 and III.A.2 for additional information on eligibility.
6. **Cost Sharing or Matching Funds:** Cost sharing or “matching” is not required; however, applicant “leveraging” contributions are encouraged (see Section V.A.3.d).
7. **Number of Applications:** There is no limit on the number of applications that each applicant may submit.
8. **Grants.gov:** The applications for these NOFAs can be found at [Grants.gov](#). The 2013 **General Section** contains information on submission requirements and procedures. Please carefully review the 2013 **General Section** before reading the program section so that you understand the [Grants.gov](#) electronic application process.

## **FULL TEXT OF ANNOUNCEMENT**

### **I. FUNDING OPPORTUNITY DESCRIPTION**

#### **A. Purpose of the Program:**

The overall goal of the Healthy Homes Technical Studies program is to gain knowledge to improve the efficacy and cost-effectiveness of methods for evaluation and control of housing-related health and safety hazards. This also supports HUD’s Strategic Goal to utilize housing as a platform for improving the quality of life and health outcomes for those living in HUD-assisted and HUD-regulated housing, and the associated policy priority to build inclusive and sustainable communities by improving the health of community residents while reducing the impact of communities on the environment.

**B. Program Description:**

HUD is funding studies to improve HUD's and the public's knowledge of housing-related health and safety hazards, and to improve or develop new hazard assessment and control methods, with a focus on key residential health and safety hazards. HUD is especially interested in applications which will advance our knowledge on key healthy homes issues by addressing important gaps in the science related to the accurate and efficient identification of hazards and cost effective hazard mitigation. Key hazards are discussed in Appendix A, *Key Residential Health and Safety Hazards*, of this NOFA. A list of references that serves as the basis for the information provided in this NOFA is provided as Appendix B, *Relevant Publications and Guidelines*.

**1. General Goals**

The overall goals and objectives of the Healthy Homes (HH) Program, which includes the Healthy Homes Technical Studies program and the Healthy Homes Production Grant Program (see the Healthy Homes Production Grant Program NOFA published separately) are to: (1) Mobilize public and private resources, involving cooperation among all levels of government, the private sector, grassroots community-based organizations, including faith-based organizations, and other non-profit organizations, to develop and implement the most promising, cost-effective methods for identifying and controlling housing-related hazards; and, (2) Build local capacity to operate sustainable programs that will continue to prevent, minimize, and control housing-related hazards in low- and very low-income residences when HUD funding is exhausted.

The HH Program departs from the more traditional programmatic approach of focusing on single health and safety issues attempting to correct one hazard at a time (e.g., lead hazards, radon). HUD is interested in promoting evidence-based approaches that are cost-effective and efficient and result in the reduction of health threats for the maximum number of residents and, in particular, children and other vulnerable populations in low income households.

A description of the HH Program is available on the HUD website at <http://www.hud.gov/offices/lead/hhi/index.cfm>, and the *Healthy Homes Strategic Plan*, published by HUD in 2009, is available at [http://portal.hud.gov/hudportal/documents/huddoc?id=hhstratplan\\_7\\_9\\_09.pdf](http://portal.hud.gov/hudportal/documents/huddoc?id=hhstratplan_7_9_09.pdf).

In addition to deficiencies in basic housing conditions that may impact health, other more subtle health hazards may exist in the residential environment (e.g., asthma triggers, volatile and semi-volatile organic compounds, pesticide residues). While some hazards will be found disproportionately in housing that is substandard (e.g., structural problems, lack of adequate heating and cooling, moisture infiltration), housing-related environmental hazards may also exist in housing that is otherwise of good quality. Appendix A of this NOFA briefly describes the key housing-associated health and injury hazards HUD considers targets for intervention.

HUD has also developed resource papers on a number of topics of importance under the HH Program, including mold, environmental aspects of asthma, carbon monoxide, pesticides, and unintentional injuries. These resource papers can be downloaded from <http://www.hud.gov/offices/lead/hhi/index.cfm>.

Application for additional work related to ongoing HUD-funded technical studies (i.e., for work outside of the scope of the original agreement) are eligible to compete with applications for awards on new subjects. These applications will be evaluated in the same manner as applications on new subjects. Brief descriptions of current and recently completed Healthy Homes Technical Studies projects and grantee contact information can be found on the HUD website at [http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/healthy\\_homes/hhi/hhts](http://portal.hud.gov/hudportal/HUD?src=/program_offices/healthy_homes/hhi/hhts).

## **2. Community Participation**

HUD believes that it is important for researchers to incorporate some aspect of meaningful community participation in the development and implementation of studies that are conducted in communities and/or involve significant interaction with community residents. Community participation can improve study effectiveness in various ways, including the development of more appropriate research objectives, improving recruitment and retention of study participants, improving participants' involvement in and understanding of a study, improving ongoing communication between researchers and the affected community, and more effectively disseminating study findings. HUD encourages applicants to consider using a "community based participatory research" (CBPR) approach, where applicable, in study design and implementation. (See, e.g., the report published by the National Institute of Environmental Health Sciences titled "Successful Models of Community-Based Participatory Research" at [http://portal.hud.gov/hudportal/documents/huddoc?id=DOC\\_12485.pdf](http://portal.hud.gov/hudportal/documents/huddoc?id=DOC_12485.pdf).)

CBPR is characterized by substantial community input in all phases of a study (i.e., design, implementation, data interpretation, conclusions, and communication of results).

### **C. Authority:**

The Healthy Homes Technical Studies program is authorized under sections 501 and 502 of the Housing and Urban Development Act of 1970 (12 U.S.C. §§ 1701z-1 and 1701z-2). Fiscal Year 2013 funds are authorized under the Department of Housing and Urban Development Appropriations Act, 2013 (Public Law XXX XX), approved on XXX XX XXXX.

### **D. Changes in the FY 2013 NOFA:**

The following is a summary of major changes in this NOFA relative to the FY2012 Healthy Homes Technical Studies NOFA. This is not intended to be an exhaustive list, so applicants should be sure to read the entire NOFA.

1. **Threshold Score Requirement.** To be eligible to receive a full evaluation, applications must receive a minimum score of 14 points for Rating Factor 2. Applications that do not receive this minimum score will not be further reviewed and will not be eligible for funding.

2. **Funding for New Applicants.** Subject to enactment of the FY 2013 HUD appropriations, HUD will make available up to \$750,000 for qualified "new applicants," i.e., organizations that have not received a HUD Healthy Homes Technical Studies Program award as the primary grantee.

3. Maximum Grant Awards. The maximum funding for an award under this NOFA is \$750,000 for the entire period of the grant. This dollar amount may be modified subject to the availability of appropriations.
4. Bonus Points. HUD is **not** awarding bonus points for work conducted in federally designated Renewable Communities (RCs), Empowerment Zones (EZs), or Enterprise Communities (ECs) (formally referred to as RC/EZ/EC IIs) in FY 2013.
5. HUD has added new topics of particular interest as well as topics that the Department will **not** fund in FY 2013 (see sections III.C.1 (2) and (3)).
6. Points may be deducted under rating factor 1, section a(2)(b), for proposed sub-recipients who were awarded a Healthy Homes Technical Studies grant in the past but did not make a credible attempt to publish the study findings.
7. The project management component that was previously a sub-factor under rating factor 3 was incorporated into factor 5 and the title of factor 5 was changed to reflect the emphasis on project management and progress tracking.

## II. AWARD INFORMATION

### A. Funding Available

1. Cooperative agreements will be awarded on a competitive basis following evaluation of all eligible proposals according to the rating factors described in Section V.A.3. Subject to the enactment of the FY 2013 HUD appropriations, HUD anticipates that approximately X to X awards will be made ranging from approximately \$300,000 to a maximum of \$750,000 each. This dollar amount may be modified subject to the availability of appropriations.
2. **New Applicants**. Subject to enactment of the FY 2013 HUD appropriations, HUD anticipates that up to \$750,000 will be available for qualified “new applicants,” i.e., organizations that have not been previously funded by the Office of Healthy Homes and Lead Hazard Control (OHHLHC) under the Healthy Homes Technical Studies Grant Program as the primary grantee. A “new applicant” may have previously been a sub-grantee under an award to another organization. If there are not enough qualified new applicants for funding, any remaining funds will be made available to other applicants based on the final ranking.

### B. Anticipated Start Date and Period of Performance for New Grants:

The start date for new awards is expected to be not later than **XXXXXX XX, 2013**. The start date is subject to the availability of appropriations. The period of performance cannot exceed 36 months from the time of award. The proposed performance period should include adequate time for such project components as the Institutional Review Board process, if required, the recruitment of study participants and/or new staff, and the development of new instrumentation or methods (e.g., analytical methods), all of which have been found to delay projects in the past. Period of performance extensions for delays due to **exceptional conditions beyond the grantee's control will be considered** for approval by HUD in accordance with 24 CFR

84.25(e)(2) or 85.30(d)(2), as applicable, and the OHHLHC Program Guide. If requested and determined to be appropriate and subsequently approved by OHHLHC, grantees will be eligible to receive a single extension of up to 12 months in length.

### **C. Type of Award Instrument:**

Awards will be made as cooperative agreements. Anticipated substantial involvement by HUD staff for cooperative agreements may include, but will not be limited to:

1. Review and suggestion of amendments to the study design, including: study objectives; field sampling plan; data collection methods; sample handling and preparation; and sample and data analysis.
2. Review and provision of technical recommendations in response to quarterly progress reports (e.g., amendments to study design based on preliminary results).
3. Review and provision of technical recommendations on the journal article(s) and final study report.

## **III. ELIGIBILITY INFORMATION**

### **A. Eligible Applicants:**

1. Academic and non-profit institutions located in the United States, state and units of local government and federally recognized Native American tribes are eligible under all existing authorizations. For-profit firms also are eligible; however, they are not allowed to earn a profit from the grant. Applications to supplement existing projects are eligible to compete with applications for new awards. Neither Federal agencies nor individuals are eligible to submit applications. The 2013 **General Section** identifies threshold requirements that must be met for an organization to receive an award.

2. If your organization received an award under the FY2012 Healthy Homes Technical Studies Grant Program cycle, you are not eligible to apply, unless you apply with a different Principal Investigator.

**B. Cost Sharing or Matching:** Cost sharing or matching is not required. In rating your application, however, you will receive a higher score under Rating Factor 4 if you provide evidence of significant resource leveraging.

### **C. Other:**

#### **1. Eligible Activities.**

- (1) HUD expects to advance the recognition and control of residential health and safety

hazards and more closely examine the link between housing and health. The overall objectives of the Healthy Homes Technical Studies Program include, but are not limited to:

- (a) Development and evaluation of low-cost test methods and protocols for identification and assessment of housing-related hazards.
- (b) Development and assessment of cost-effective methods for reducing or eliminating housing-related hazards.
- (c) Evaluation of the effectiveness of housing interventions including educational interventions, and barriers and incentives affecting future use of the most cost-effective strategies.
- (d) Investigation of the epidemiology of housing-related hazards and illness and injuries associated with these hazards, with an emphasis on vulnerable populations (e.g., children, senior citizens, etc.).
- (e) Analysis of existing data or generation of new data to improve knowledge regarding the prevalence and severity of specific hazards in various classes of housing, with a focus on low-income housing.
- (f) Improved understanding of the relationship between a residential exposure and illness or injury of children or other vulnerable populations. Applicants that propose this type of study should discuss how the knowledge that is gained from the study could be used in a program to reduce these hazards in target communities.
- (g) Rigorous evaluation of policies that contribute to the supply of affordable, healthy and energy efficient housing.

(2) HUD is particularly interested in the following topics:

- (a) Assessing or improving the efficacy of current methods for residential Integrated Pest Management (IPM). (See, for example, *Integrated Pest Management, A Guide for Affordable Housing*, available at: [www.Stoppests.org](http://www.Stoppests.org) and the CDC's IPM web page, <http://www.cdc.gov/nceh/ehs/eLearn/IPM.htm>).
- (b) Developing easily replicable, cost-effective methods for preventing and controlling mold and excess moisture in various types of residential buildings.
- (c) Improving indoor air quality, such as through cost-effective approaches to upgrading residential ventilation or improving control/management of combustion appliances. This includes studies of practical approaches to mitigate the health impacts from infiltration of ambient air pollution (e.g., respirable particulate) due to motor vehicle emissions from roadways and transportation hubs such as bus terminals, etc.
- (d) Evaluating the effectiveness of education and outreach methods designed to provide at risk families (including minority families and those with limited English proficiency) with the knowledge to adopt self-protective behaviors with respect to residential health hazards. If you propose a study in this focus area you should cite and discuss the theoretical basis for the education/outreach approach that you are proposing.
- (e) Determining the effectiveness of housing interventions on adult respiratory health (e.g., asthma, COPD). Considerable research has been conducted on the effectiveness of environmentally-focused residential interventions on improving asthma control in children, but little information has been reported on the effectiveness of similar interventions on asthma or other respiratory illness among adults.
- (f) Thirdhand Smoke (THS): Some research has indicated that THS (i.e., the residue from tobacco smoke that collects on interior surfaces) could result in significant exposure to

toxic substances. Additional research is needed to improve our understanding of exposure to these residues and their potential health impact and the efficacy of cleaning techniques in reducing THS residue from surfaces in homes.

(g) Conducting cost-benefit or cost-effectiveness studies on the health benefits of healthy homes interventions in high risk populations (e.g., implementation of smoke-free housing policies, reductions in the incidence of injuries among children or the elderly, reductions in asthma morbidity through improvements to indoor environmental quality). Applicants are encouraged to team with existing projects or studies through which the housing interventions are being conducted.

(h) Injury Prevention Measures: HUD is interested in demonstrating the feasibility and cost-effectiveness of incorporating injury prevention measures into residential programs, including green renovation and rehabilitation programs. Such measures (e.g., grab bars in showers, anti-scald devices, lockable medicine cabinets) are not typically included in building programs but could be incorporated to enhance the effects of the program on resident safety and health.

(i) Other Focus Areas that are Consistent with the Overall Goals of HUD's Healthy Homes Technical Studies Program. HUD will consider funding applications for technical studies on other topics that are consistent with the overall goals and objectives of the Healthy Homes Technical Studies program, as described above. In such instances, for an applicant to receive an award, it is necessary that the applicant describe in sufficient detail how the proposed study is consistent with the overall program goals and objectives.

(3) HUD **will not** fund applications on the following topics:

(a) Studies that focus on the effects of retrofits to existing housing for the purpose of improving energy efficiency on indoor air quality or other measures of indoor environmental quality or on occupant health.

(b) Studies that focus on the effects of "green" construction (e.g., the use of low emission materials), including both rehab and new construction, on measures of indoor environmental quality or occupant health.

**2. General Information.** You may address one, or more than one, of the above technical studies topic areas within your proposal, or submit separate applications for different topic areas. In proposing to conduct a study on a particular topic, applicants should consider:

a. The ability of the study to generate definitive results. Because the size of the awards under this NOFA limits the ability of applicants to design and implement research on health outcomes using the strongest methodology (i.e., a randomized controlled trial), applicants should consider focusing on important indoor environmental quality (IEQ) measures instead of health outcomes in studies where this is appropriate. A focus on environmental outcomes is generally expected to produce more definitive results as opposed to a health outcomes focus, and the impact of improvements to IEQ on health outcomes can be inferred where the evidence base is sufficient.

b. The "fit" of the proposed hazard assessment and/or control methods within the overall goal of addressing "priority" health and safety hazards in a cost-effective manner;

c. The expected efficacy of the proposed methods for hazard control and risk reduction. Questions to consider include the degree to which interventions would be accepted by

occupants, ease and cost of implementation, and the length of time the intervention would stay effective;

d. Where and how these methods would be applied and tested, and/or perform demonstration activities; and

e. The degree to which the study will help develop practical, widely applicable and accepted methods and protocols or improve our understanding of a residential health hazard.

Applicants should consider the efficiencies that might be gained by working cooperatively with one or more recipients of HUD's Healthy Homes Production grants or Lead-Based Paint Hazard Control or Lead Hazard Reduction Demonstration grants, which are widely distributed throughout the United States. Information on current grantees is available at [http://portal.hud.gov/hudportal/HUD?mode=disppage&id=PAGE\\_LHC\\_5081](http://portal.hud.gov/hudportal/HUD?mode=disppage&id=PAGE_LHC_5081).

**NOTE:** A limited amount of hazard control activities, which involve construction rather than research, may be conducted as part of a Healthy Homes Technical Studies project (see Section IV.E.9).

**3. Threshold Requirements Applicable to all Applicants.** To receive an award of funds from HUD, you must meet all threshold requirements set forth in section III.C.2 of the 2013 **General Section**, and must be an eligible applicant under this NOFA. Where an application involves more than one entity, each entity must satisfy the civil rights threshold set forth at section III.C.2.d of the FY 2013 General Section "*Resolution of Outstanding Civil Rights Matters.*"

#### **4. Program Requirements.**

a. Program Performance. Grantees shall take all reasonable steps to accomplish all activities within the approved period of performance. HUD reserves the right to terminate the cooperative agreement prior to the expiration of the period of performance if the grantee fails to make reasonable progress in implementing the approved program of activities or fails to comply with the terms of the cooperative agreement.

b. Regulatory Compliance. Grantees must comply with all relevant federal, state, and local regulations regarding exposure to and proper disposal of hazardous materials.

c. Blood Lead Testing. Any blood lead testing, blood lead level test results, medical referral, or follow-up for children under 6 years of age must be conducted according to the recommendations of the Centers for Disease Control and Prevention (CDC), Preventing Lead Poisoning in Young Children (see Appendix B of this NOFA).

d. Restricted Use of Funds. HUD technical studies grant funds will not replace existing resources dedicated to any ongoing project.

- e. Laboratory Analysis for Lead. Laboratory analysis covered by the EPA's National Lead Laboratory Accreditation Program (NLLAP) must be conducted by a laboratory recognized under the program, unless approved by HUD.
- f. Laboratory Analysis for Mold. Samples to be analyzed for mold (fungi) must be submitted to a laboratory accredited through the Environmental Microbiological Laboratory Accreditation Program (EMLAP), administered by the American Industrial Hygiene Association (AIHA), unless approved by HUD.
- g. Human Research. Human research subjects will be protected from research risks in conformance with Federal Policy for the Protection of Human Subjects, required by HUD at 24 CFR 60.101, which incorporates the Department of Health and Human Services (DHHS) Protection of Human Subjects regulation at 45 CFR part 46. (See section V.A3c(3)(c), below, regarding the Institutional Review Board process, which is required for some technical studies.)
- h. OSHA Compliance. The requirements of the Occupational Safety and Health Administration (OSHA) (e.g., 29 CFR parts 1910 and/or 1926, as applicable) or the state or local occupational safety and health regulations, whichever are most stringent, will be met.
- i. Civil Rights. The institution administering the grant must comply with all nondiscrimination requirements as set forth in section III.C.4 of the FY 2013 **General Section**.
- j. Disclosure. All test results and other information in pre-1978 housing related to lead-based paint or lead-based paint hazards must be provided to the owner of the unit, together with a statement describing the owner's legal duty to disclose the knowledge of lead-based paint and its hazards to prospective tenants (before initial leasing, or before lease renewal with changes) and buyers (before sale) (24 CFR Part 35, subpart A). Disclosure of other identified housing-related health or safety hazards to the owner of the unit, for purposes of remediation, is encouraged but not required by HUD.
- k. Privacy. Submission of any information to databases (whether website, computer, paper, or other format) of addresses of housing units identified, treated or cleared under these studies is subject to the protections of the Privacy Act of 1974, and shall not include any personal information that could identify any household member. You should also check to ensure you meet state and local privacy regulations.
- l. Community Involvement. Applicants must incorporate meaningful community involvement into any study that requires a significant level of interaction with a community during implementation (e.g., projects being conducted within occupied dwellings or which involve surveys of community residents). The term community refers to a variety of populations comprised of persons who have commonalities that can be identified (e.g., based on geographic location, ethnicity, health condition, common interests). Applicants should identify the community that is most relevant to their particular project. Meaningful community involvement also requires that recipients ensure that information provided to the community during these activities is provided in a manner that is effective for persons with disabilities (See 24 CFR §

8.6) and gives meaningful access to persons with limited English proficiency (LEP).

There are many different approaches to involving the community in the conception, design, and implementation of a study and the subsequent dissemination of findings. Examples include but are not limited to: establishing a structured approach to obtain community input and feedback (e.g., through a community advisory board); including one or more community-based organizations as study partners; employing community residents to recruit study participants and collect data; and enlisting the community in the dissemination of findings and translation of results into improved policies and/or practices. A discussion of community involvement in research involving housing-related health hazards can be found in Chapter 5 of the Institute of Medicine publication titled “Ethical Considerations for Research on Housing-Related Health Hazards Involving Children” (see Appendix B for more information on this report).

m. **Economic Opportunities for Low- and Very Low-Income Persons (Section 3).** Section 3 of the Housing and Urban Development Act of 1968 (12 U.S.C. § 1701u) applies to this program when activities conducted pursuant to this NOFA include housing construction or rehabilitation (including reduction and abatement of lead-based paint hazards). Section 3 requires that, to the greatest extent feasible, training, employment, contracting, and other economic opportunities to low- and very low-income persons, particularly those who are recipients of government assistance for housing, and to business concerns that provide economic opportunities are directed to low- and very low-income persons in the area in which the project is located. For more information on these requirements, see 24 CFR Part 135 and section III.C.4.d of the FY 2013 **General Section**.

n. **Standardized Dust Sampling Protocol and Quality Control Requirements.** Grantees collecting samples of settled dust from participant homes for environmental allergen analyses (e.g., cockroach, dust mite) will be required to use a standard dust sampling protocol, unless the grantee provides compelling justification to use an alternate protocol (e.g., the study involves the development of an alternative sampling method). The HUD protocol can be found on the OHHLHC website at: <http://www.hud.gov/offices/lead/hhi/hhiresources.cfm>. Grantees conducting these analyses may also be required to include quality control dust samples, provided by OHHLHC at no cost to the grantee, with the samples that are submitted for laboratory analyses.

o. **Requirements for peer review of scientific data in accordance with the Office of Management and Budget Information Quality Guidelines.** All HUD-sponsored research is subject to the OMB Final Information Quality Bulletin for Peer Review (70 FR 2664-2677, January 14, 2005) prior to its public dissemination. In accordance with paragraph II.2 of the Bulletin, HUD will not require further peer review conducted on information that has already been subjected to adequate peer review.

p. **Principal Investigator (PI)** The PI for the proposed study must directly represent and be directly employed by the applicant for the proposed role in the grant application. If the proposal includes co-PIs, the lead co-PI must represent and be directly employed by the applicant.

5. **DUNS Requirement.** Refer to the FY 2013 **General Section** for information regarding the

DUNS requirement. A DUNS number must be provided for the institution that is submitting an application. Your DUNS number must be included in your electronic application submission. Be sure to use the DUNS number that you use to register as an Authorized Organization Representative (AOR) with [Grants.gov](http://www.grants.gov). Be sure that your eBusiness Point of Contact has authorized you to submit an application on behalf of the applicant organization (see the FY 2013 **General Section** for details about the [Grants.gov](http://www.grants.gov) registration process).

#### **IV. APPLICATION AND SUBMISSION INFORMATION**

If you are interested in applying for funding under this program, please review carefully the FY 2013 **General Section** and the following additional information.

**A. Addresses to Request Application Package:** All applications must be submitted electronically. The information required to submit an application is contained in the program section of this NOFA and the FY 2013 **General Section**. Applications can be downloaded from the web at: [http://www.grants.gov/applicants/apply\\_for\\_grants.jsp](http://www.grants.gov/applicants/apply_for_grants.jsp). [Grants.gov](http://www.grants.gov) provides customer support information on its website at <http://www.grants.gov/contactus/contactus.jsp>. Applicants having difficulty accessing the application and instructions or having technical problems can receive customer support from [Grants.gov](http://www.grants.gov) by calling (800) 518-GRANTS (this is a toll-free number) or by sending an email [to\\_support@grants.gov](mailto:to_support@grants.gov). (Hearing- or speech-challenged individuals may access this number through TTY by calling the toll-free Federal Relay Service at 800-877-8339.) The [Grants.gov](http://www.grants.gov) Help Desk can be reached twenty-four hours per day, seven days per week, except federal holidays. HUD recommends calling the Help Desk rather than emailing, because determining the basis for the problem may take some conversation with the [Grants.gov](http://www.grants.gov) Support Customer Service Representative.

#### **B. Content and Form of Application Submission:**

1. Applicant Data. Your application must contain the items listed in this section. These items include the standard forms contained in the FY 2013 **General Section** that are applicable to this funding announcement (collectively referred to as the "standard forms"). Copies of these forms are available on line at [http://www.grants.gov/applicants/apply\\_for\\_grants.jsp](http://www.grants.gov/applicants/apply_for_grants.jsp). The required items are:

a. Application Abstract (two page maximum). An abstract with the project title, the names and affiliations of all investigators, and a summary of the objectives, study design and expected results, and the total funds requested, and must be included in the proposal. Information contained in the abstract will not be considered in the evaluation and scoring of your application, and will not be counted towards the 25 page maximum. Any information you wish to be considered should be provided under the appropriate rating factor response.

b. All forms as required by the FY 2013 General Section. Form HUD2991\_Certification\_of\_Consistency\_with\_the\_Consolidated\_Plan is not required with the application for this program.

c. Response to Rating Factors. A project description/narrative statement addressing the rating factors for award. The narrative statement must be identified in accordance with each factor for

award (Rating Factors 1 through 5). Number the pages of your narrative statement. The project description or narrative must be included in the responses to the rating factors. The response to the rating factors should not exceed a total of 25 pages, with a minimum 12-point font and a minimum margin width of 1-inch on all sides. **Any pages in excess of this limit will not be read.** The points you receive for each rating factor will be based on the portion of your narrative statement that you submit in response to that particular factor, supplemented by any appendices that are referenced in your narrative response to the rating factor. Supporting materials that are not referenced or discussed in your responses to the individual rating factors will not be considered. Additional materials (e.g., appendices) must be submitted with your application according to the directions in the FY 2013 **General Section**. The footer on the pages of these materials should identify the rating factor that they are supporting.

d. Supporting Materials. Include, as appendices, the resumes of the principal investigator and other key personnel and other materials that are needed in your response to the rating factors (e.g., organizational chart, letters of commitment, a list of references cited in your responses to the rating factors). Each resume shall not exceed three pages, and is limited to information that is relevant in assessing the qualifications and experience of key personnel to conduct and/or manage the proposed technical studies. This information will not be counted towards the Rating Factors narrative 25-page limit.

e. Additional Information. Submit other optional information provided in support of your application following the directions in the FY 2013 **General Section**. These additional optional materials must not exceed 20 pages. Any pages in excess of this limit will not be read. Do not include additional narrative information that is an extension of or expands upon any of your rating factor responses. Such narrative will not be considered.

f. Budget. Include a total budget using form HUD424CBW with supporting cost justification of up to four pages, which will cover all budget categories of the federal grant request. This information will not be counted towards the Rating Factors narrative 25-page limit. Use the budget format discussed in Rating Factor 3, Section V.A.3.c, below. In completing the budget forms and justification, you should address the following elements:

(1) Direct Labor costs, including all full- and part-time staff required for the planning and implementation phases of the project. These costs should be based on full time equivalent (FTE) or hours per year (hours/year) (i.e., one FTE equals 2,080 hours/year);

(2) Allowance for one trip to HUD Headquarters in Washington, DC, for each year of your grant, planning each trip for one person. The first trip will occur shortly after grant award for a stay of two or three days, depending on your location, and the remaining trips will have a stay of one or two days, depending on your location;

(3) A separate budget form and justification for each sub-recipient receiving more than 10 percent of the total federal budget request;

(4) Supporting documentation for salaries and prices of materials and equipment, upon request; and

(5) Indirect Cost Rates. Organizations that have a federally negotiated indirect cost rate should use that rate and the appropriate base. The documentation will be verified during award negotiations and should not be included in this application submission. Organizations that do not have a federally negotiated rate schedule must obtain a rate from their cognizant federal agency; otherwise the organization will be required to obtain a negotiated rate through HUD. Please see

<http://www.hud.gov/offices/adm/grants/fundsavail.cfm> for reference to the Indirect Cost requirements.

g. Checklist for Technical Studies Program Applicants

- (1) Applicant Abstract (limited to 2 pages)
- (2) Rating Factor Responses (Total narrative response limited to 25 pages.)
  - (a) Capacity of the Applicant and Relevant Organizational Experience (20 points)
  - (b) Need for the Research (20 points)
  - (c) Soundness of Approach (44 points)
  - (d) Leveraging Resources (6 points)
  - (e) Achieving Results and Project Management (10 points)
- (3) Required materials in response to rating factors (does not count towards 25-page limit)
  - (a) Resumes of Key Personnel (limited to 3 pages per resume; please do not include Social Security Numbers on resumes)
  - (b) Organizational Chart
  - (c) Letters of Commitment (if applicable). Letters of commitment should include language defining the activities to be performed, the contributions to be made, and the monetary value of each. **NOTE:** HUD recommends against including letters of support that do not commit services, materials, or funds; they will not add to the consideration of your application.
  - (d) Affirmatively Furthering Fair Housing Requirements (if applicable) - If the Affirmatively Furthering Fair Housing requirements apply to your proposed project as described in Section V.A.3.c(4)(a), below, you must include the applicable narrative discussed in that section in your application; failure to comply will result in the application not being considered for award.
- (4) Optional material in support of the Rating Factors (20 page limit)
- (5) Required Forms and Budget Material
  - (a) Form SF424\_Application\_for\_Federal\_Assistance (Be sure to correctly identify the NOFA title, Funding Opportunity Number, and CFDA number. Applicants must also include the nine digit zip code (zip code plus four digits) associated to the applicant address in box 8d of the SF424.
  - (b) Form HUD424CBW\_Budget\_Worksheet for the entire project.
  - (c) Budget justification narrative for each form HUD424CBW submitted. This justification is especially important for providing support for major budget items (e.g., labor, sub-recipients, consultants, costly equipment/analyses).
  - (d) Form HUD96012\_Capacity\_of\_the\_Applicant\_and\_Relevant\_Organizational\_Experience).
  - (e) Form HUD96015\_Leveraging\_Resources.
  - (f) Form 424\_Supplement\_Survey\_on\_Ensuring\_Equal\_Opportunities\_for\_Applicants (Faith\_Based\_EEO\_Survey SF424SUPP) on [Grants.gov](http://Grants.gov) (to be completed by private nonprofit organizations only).
  - (g) Form SFLLL\_Disclosure\_of\_Lobbying\_Activities (indicate “not applicable” on the form and submit the signed form if there are no lobbying activities to disclose).

(h) Form HUD2880\_Applicant/Recipient\_Disclosure/Update\_Report ("HUD\_Applicant\_Recipient\_Disclosure\_Report" on [Grants.gov](http://Grants.gov)).

### **C. Receipt Dates and Times:**

1. Electronic applications must be received and validated by [Grants.gov](http://Grants.gov) on or before 11:59:59 PM eastern time on the application deadline date. HUD may modify the due date for this Notice to the extent a final appropriations bill for FY 2013 is enacted. HUD will issue a technical correction to the NOFA if appropriations are enacted that require HUD to modify the funding criteria or application requirements, or if HUD determines that adjustments to estimated award amounts or timelines are necessary. Any such technical correction will provide detailed instructions for applicants to permit them to resubmit the application to address the revised NOFA requirements.

Refer to the FY 2013 **General Section** for submission requirements. See the FY 2013 **General Section** for what to do if your application is rejected by the [Grants.gov](http://Grants.gov) system. Please allow time for this process to ensure that you meet the timely receipt requirements.

Please see the 2013 **General Section** for instructions for timely receipt, including actions to take if the application is rejected. Applicants should carefully read the section titled "INSTRUCTIONS ON HOW TO DOWNLOAD AN APPLICATION PACKAGE AND APPLICATION INSTRUCTIONS" in the 2013 **General Section**. This section contains information on using Adobe Reader, HUD's timely receipt policies, and other application information.

**D. Intergovernmental Review:** This NOFA is excluded from the requirement of an Intergovernmental Review.

### **E. Funding Restrictions:**

**1. Administrative Costs.** There is a 10 percent maximum allowance for administrative costs. For each kind of organization, a set of Federal principles determines allowable costs. Allowable costs shall be in accordance with the cost principles applicable to the organization incurring the costs. Specifically, see [2 CFR 220](http://www.ecfr.gov/g2/cfr/title-2/cfr-220) - Cost Principles for Educational Institutions, [2 CFR 225](http://www.ecfr.gov/g2/cfr/title-2/cfr-225) - Cost Principles for State, Local, and Indian Tribal Governments, or [2 CFR 230](http://www.ecfr.gov/g2/cfr/title-2/cfr-230) - Cost Principles for Nonprofit Organizations. (OMB relocated its cost principles Circulars A-21, regarding educational institutions, A-87, regarding governments, and A-122, regarding nonprofits, to title 2 of the Code of Federal Regulations; the regulations supersede the circulars (70 *Federal Register* 51880, 51910, and 51927, respectively, August 31, 2005).)

**2. Indirect Costs.** Please see <http://www.hud.gov/offices/adm/grants/fundsavail.cfm> for reference to the Indirect Cost requirements.

**3. Purchase of Real Property.** The purchase of real property is not an allowable cost under

this program.

**4. Purchase or Lease of Equipment.** The purchase or lease of equipment having a per unit cost in excess of \$5,000 is not an allowable cost, unless prior written approval is obtained from HUD.

**5. Medical Treatment.** Medical treatment costs are not allowable under this program.

**6. Profit.** For profit institutions are not allowed to earn a profit.

**7.** You must comply with the Coastal Barrier Resources Act (16 U.S.C. § 3501).

**8.** You may not conduct lead-based paint or healthy home hazard control activities or related work that constitutes construction, reconstruction, repair or improvement (as referenced in Section 3(a)(4) of the Flood Disaster Protection Act of 1973 (42 U.S.C. §§ 4001-4128)) of a building or mobile home which is located in an area identified by the Federal Emergency Management Agency (FEMA) as having special flood hazards unless:

a. The community in which the area is situated is participating in the National Flood Insurance Program in accordance with the applicable regulations (44 CFR parts 59-79), or less than a year has passed since FEMA notification regarding these hazards; and

b. Where the community is participating in the National Flood Insurance Program, flood insurance on the property is obtained in accordance with section 102(a) of the Flood Disaster Protection Act (42 U.S.C. § 4012a(a)). You are responsible for assuring that flood insurance is obtained and maintained for the appropriate amount and term.

**9. Construction Activities.** The amount of HUD Healthy Homes Technical Studies grant funds used for construction activities, i.e. to support or supplement a new housing construction or substantial rehabilitation project, may not exceed 20% of the total HUD funds awarded. Furthermore, the majority of any funds dedicated to construction activities shall be spent for interventions not intended for lead hazard control.

**10.** Costs related to animal testing are not allowable under this program.

**F. Other Submission Requirements:** Applicants are required to submit applications electronically via the website: [http://www.grants.gov/applicants/apply\\_for\\_grants.jsp](http://www.grants.gov/applicants/apply_for_grants.jsp), unless they have requested and been granted a waiver from the electronic submission requirement. See section IV.B of the FY 2013 **General Section** for additional information on the electronic process requirement and how to request a waiver from the requirement if necessary. Applicants should submit their waiver requests in writing using email. Waiver requests must be submitted no later than 25 days prior to the application deadline date and should be submitted to: [OHHLHCNOFAreview@hud.gov](mailto:OHHLHCNOFAreview@hud.gov). If the applicant is granted an electronic submission waiver, the notification will provide instructions on where and to whom to submit the application, and how many copies are required. Paper applications will not be accepted from applicants that have not been granted a waiver. **All applications in paper format must have received a waiver to the electronic application requirement and the application must be received by HUD no later than 3:59:59 PM eastern time on the application deadline date.**

## V. APPLICATION REVIEW INFORMATION

### A. Criteria:

**1. Threshold Requirements.** Applications that meet all of the threshold requirements will be eligible to be scored and ranked, based on the total number of points allocated for each of the rating factors described in Section V.A.3. An additional threshold requirement for this NOFA (initiated in FY 2013) is that an application must receive **a minimum score of 14 points** (i.e., 70% of the available points) for rating factor 2 (Need for the Research) for the application to be fully scored and ranked. If all threshold requirements are met, your application must receive a total score of at least 75 points to be considered for funding.

**2. Award Factors.** Each of the five factors is weighted as indicated by the number of points that are assigned to it. The maximum score that can be attained is 100. Applicants should be certain that each of these factors is adequately addressed in the project description and accompanying materials. To the extent feasible, include all of the needed information within your response to each rating factor. If your response to a particular rating factor cites information provided in your response to another rating factor, clearly indicate where the information is located so that the reviewer can easily locate it.

### 3. Rating Factors.

**a. Rating Factor 1: Capacity of the Applicant and Relevant Organizational Experience (20 Points).** This factor addresses the extent to which you have the ability, capacity and organizational resources necessary to successfully implement your proposed activities in a timely manner. The rating of your application will include any sub-grantees, consultants, sub-recipients, and members of consortia that are firmly committed to the project (generally, "subordinate organizations"). In rating this factor, HUD will consider the extent to which your application demonstrates:

(1) The capability and qualifications of key and supporting personnel (13 points). HUD will assess the qualifications of key personnel to carry out the proposed study as evidenced by academic and professional background, publications, and recent (within the past 5 years) research experience. The proposed Principal Investigator must directly represent and be compensated directly by the applicant for his or her role in the proposed study. Publications and/or research experience are considered relevant if they required the acquisition and use of knowledge and skills that can be applied in the planning and execution of the technical study that is proposed under this NOFA. HUD will also evaluate the qualifications of supporting personnel such as statisticians and research assistants. In responding to this rating factor, you must complete and submit Form HUD-96012 (Capacity of the Applicant and Relevant Organizational Experience). Partner organizations will also be evaluated with respect to their qualifications and capabilities to successfully implement their proposed project roles. Please **do not** include the Social Security Numbers (SSN) of any staff members. You must also submit an organizational

chart that shows the key players in the project, their reporting relationships, and their responsibilities. The chart may be submitted as an attachment and will not count towards the 25 page maximum.

(2) Past performance of the study team in managing similar projects (7 points).

(a) HUD will evaluate your demonstrated ability to successfully manage various aspects (e.g., personnel management, data management, quality control, reporting) of a complex technical study, as well as your overall success in completing projects on time and within budget. If applicable, provide the number and title of any past OHHLHC grants and describe the outcomes of those grants and your organization's performance in their implementation (e.g., whether they were completed on time and within budget). Also, describe the past performance of the organization (applicant and/or partners) on other projects related to residential environmental health and safety research, or other relevant experience. Provide details about the nature of the project, the funding organization, and your performance (e.g., timely completion, achievement of desired outcomes). You should also discuss the degree to which the results from past research have been used to develop new or improved methods or tools for residential hazard assessment or control.

(b) If your organization has an active OHHLHC grant or cooperative agreement, provide a description of the progress and outcomes achieved under that award. If you completed one or more HUD-funded Technical Studies grants, your performance will be evaluated in terms of achievements made under the previous grant(s). If your organization, or any of the proposed sub-recipients, received a HUD technical studies grant from OHHLHC in a Fiscal Year in which the NOFA required that grantees provide HUD with a draft manuscript for publication as a final work product (i.e., NOFAs starting in Fiscal Year 2006) and you or your proposed sub-recipient have not demonstrated a credible attempt to publish the results in a scientific or professional journal, **5 points will be deducted under this sub-factor**. Sub-recipients include organizations that were awarded a HUD technical studies grant during the relevant fiscal years as well as individuals that held a position of authority (i.e., PI or co-PI) on funded cooperative agreements.

**b. Rating Factor 2: Need for the Research (20 Points).** This factor addresses the extent to which there is a need for the proposed technical study based on the extent to which it is expected to advance scientific knowledge on a key healthy homes issue by addressing an important information gap. Applications must receive a minimum score of 14 points (i.e., based on the scores from at least two reviewers) for this rating factor for the application to remain eligible for an award. In responding to this factor, you should document in detail how your project will make a significant contribution towards achieving some or all of HUD's stated goals and objectives for one or more of the topic areas described in Section I.B.1. For example, you should demonstrate how your proposed study addresses a need with respect to a key knowledge gap for a particular topic, keeping in mind that HUD is particularly interested in protecting the health of children and other sensitive populations such as seniors. This is especially important for applicants that are proposing to study a healthy homes topic that is not highlighted as a priority area by HUD in section III.C. Specific issues to be addressed for this factor include:

(1) A concise review of the research need that is addressed by your proposed study and why it is consistent with the goals and objectives of the NOFA; identify which NOFA goals and objectives are addressed by the proposed study. Explain why the knowledge gap that your proposed study will address is considered key (based on identified gaps in the literature or well

documented knowledge from professional practice) for advancing our understanding of an important “healthy homes” issue. The importance of the issue that the proposed study addresses can be demonstrated by factors such as: the severity of the illness/injury that is addressed; the prevalence of the condition; the economic impact of the issue, and the impact of the illness/injury on vulnerable populations. Applicants proposing research on a topic identified in section III.C.1 (2) of this NOFA will be awarded a point under this rating factor. (10 points)

(2) A discussion of how your proposed study would significantly advance the current state of scientific knowledge by summarizing its relationship to past research that is published in the peer-reviewed literature and/or which builds upon pilot research that has not been published (a summary of the latter data should be provided in the application, if applicable). HUD will award the most points under this sub factor for proposals that are expected to have the greatest impact in advancing the evidence base on key healthy homes topics, and thus advance the knowledge base needed to advance practice and widespread adoption of the healthy homes concept. (6 points)

(3) A discussion on how you anticipate your study findings will be used to improve current methods for assessing or mitigating the hazards under study, particularly for affordable housing. If applicable, indicate why the method/protocol that would be improved through your study would lead to improved practice and be widely adopted (e.g., low cost, easily replicated, lack of other options) or how the knowledge gained through your proposed study will provide an important contribution to the advancement of the “healthy homes” concept. (4 points)

**c. Rating Factor 3: Soundness of Approach (44 Points).** This factor addresses the quality of your proposed technical study plan. Specific components include the following:

(1) Soundness of the study design (30 points).

(a) Clearly and thoroughly describe your proposed study and its design, and identify the major objectives. If you are proposing a community-based research of home interventions to reduce the risk of an illness, provide evidence for the need for prevalence of the targeted condition in the community. If possible, your study should be designed to address testable hypotheses that you should state specifically and clearly.

(b) The study should be presented as a logical sequence of steps or phases with individual tasks described for each phase.

(c) Your narrative should reflect the relevant scientific literature, which should be thoroughly cited in your application. Your proposed study will be judged in part on the soundness of the underlying body of research upon which it is based (e.g., the degree to which it is based upon well-understood or poorly-understood associations from previous studies) and the clarity and soundness of your summary and interpretation of this research base. If your application also incorporates the results of unpublished research, you should clearly summarize the results of that research in your response to this rating factor.

(d) Describe the statistical basis for your study design and demonstrate that you would have adequate statistical power to test your stated hypotheses and achieve your study objectives.

(e) Discuss your plans for data management, analysis, and archiving.

(f) You should identify any important “decision points” in your study plan.

(g) You should demonstrate that it is clearly feasible to complete the study within the proposed period of performance and successfully achieve your objectives. HUD has observed that studies can miss targeted performance timelines because of delays in the IRB approval process, unexpected difficulties with recruiting study participants, or delays in developing new

laboratory methods or instruments.

If you are proposing to conduct a study that includes a significant level of community interaction (e.g., studies involving participant recruitment, survey research, environmental sampling on private property), describe your plan for meaningful involvement of the affected community in your proposed study.

You should define the community of interest with respect to your proposed study and discuss why and how your proposed approach to community involvement will make a meaningful contribution to your study and to the community. For studies in which community participants must visit a facility operated by the applicant pursuant to activities conducted under this NOFA, applicants are advised that such activities must be held in facilities that are accessible to persons with disabilities as required by Section 504 of the Rehabilitation Act and its implementing regulations at 24 CFR Part 8.

(2) **Policy Priorities (2 points)**. Indicate if your proposed study will address any of the FY 2013 policy priorities that are applicable to this NOFA (see the FY 2013 **General Section** for additional details regarding these policy priorities). You will receive a maximum of two (2) points under Rating Factor 3(2) for either of the applicable FY 2013 policy priorities that are found in the FY 2013 **General Section** and applicable to this NOFA identified below and that are adequately addressed in your application. Policy priorities that are applicable to this Technical Studies NOFA are: (1) **Capacity Building and Knowledge Sharing**; and (2) **Using Housing as a Platform for Improving Other Outcomes**. It is up to the applicant to determine which of the policy priorities outlined below they will address in order to receive the available two points. Please refer to the FY 2013 **General Section**, section I.B to see how these policy priorities should be discussed and presented in order to receive these points.

(a) **Capacity Building and Knowledge Sharing**. Applicants requesting the policy priority points must demonstrate the proposed direct impact their research can have in advancing the field of healthy homes. Applicants must identify the outputs and outcomes their projects are expected to achieve related to capacity building and knowledge sharing, as well as the outcome measures they will report on. To receive the full two (2) points under this policy priority, an applicant must respond to at least one or more of the activities listed below and explain how success will be measured during the grant performance period:

(i) **Activities:**

- Implementation of a research dissemination plan.
- Integration of the research findings with other researchers and/or practitioners in the healthy homes field.
- Presentation of research findings at academic and/or professional conferences.

(ii) **Measures of success:**

- Development of at least one new activity by partner organizations as a result of the outcomes of the research to enhance current healthy homes program activities.
- Presentation of research finding at two or more appropriate academic and/or professional conferences.
- Publication of research findings in two or more scientific and/or professional journals.

(b) **Using Housing as a Platform for Improving Other Outcomes**. To receive the full two (2) points under this policy priority, an applicant must respond to at least one or more of the activities listed below and explain how success will be measured during the grant performance

period:

(i) Activities:

- Study findings that will result in improved health outcomes as a result of new or improved methods for hazard identification or control, improved understanding of housing-related health hazards, etc.
- Coordination and information sharing with partners, such as those of local green and healthy housing initiatives that will result in improved health outcomes in the target population.
- Formation of strategic partnerships with practitioners that will commit to applying the findings of the study to improve program activities.

(ii) Measures of success:

- The study findings result in the creation tools or knowledge that can be used to improve health outcomes in target populations.
- Partner organizations commit to applying study findings in a manner that will improve health outcomes in the populations that they serve.

For this policy priority, applicants must identify the target populations to be served, the baseline from which improvements are to be measured, the anticipated impact outcome(s) and related activity, and measurements to be used to gauge the positive change to be achieved by their project. Applicants will be expected to report progress in meeting the expected goals.

(3) Quality assurance mechanisms (6 points). You must describe the quality assurance mechanisms that will be integrated into your project design to ensure the validity and quality of the results. Applicants that receive awards will be required to submit a Quality Assurance Plan to HUD. You should plan for this and include Quality Assurance activities in your study work plan.

(a) Discuss the major quality assurance mechanisms that are relevant for your proposed study. Examples of quality assurance mechanisms include, but are not limited to: procedures for selection of samples/sample sites, sample handling, use of quality control samples, validating the accuracy of instrumentation, measures to ensure accuracy during data management, staff training, and final validation of your dataset. If applicable, documents (e.g., government reports, peer-reviewed academic literature) that provide the basis for your quality assurance mechanisms should be cited. Identify who will have primary responsibility for drafting and ensuring compliance with the Quality Assurance Plan (QAP) and describe how the QAP will be used during the implementation of your study either as originally submitted or revised if needed should the quality be unacceptable. Your application will be rated on the thoroughness, clarity, and validity of your proposed quality assurance activities, and their appropriateness for ensuring the validity and quality of the data.

(b) For the collection of data using survey or other observational tools, describe the procedures that you will follow to ensure accurate data capture and transfer (e.g., transfer of data from the field to a database). Also, describe any research done (or planned) to validate the instrument.

(c) Institutional Review Boards. In conformance with the Common Rule (*Federal Policy for the Protection of Human Subjects*, codified by HUD at 24 CFR 60.101, which incorporates the DHHS regulation at 45 CFR part 46), if your research involves human subjects, your organization must provide proof (e.g., a letter signed by an appropriate official) that the research has been reviewed and approved by an Institutional Review Board (IRB) before you can initiate activities that require IRB approval. Before initiating such activities you must also provide the number for your organization's assurance (i.e., an "institutional assurance") that has been

approved by the DHHS's Office for Human Research Protections (OHRP). You must also provide proof that the IRB that approves your study is registered with the OHRP.

You do not have to provide proof of IRB approval with your application. If you do not have IRB approval yet, you should address how you will obtain such approval. Describe how you will obtain informed consent (e.g., from the subjects, their parents or their guardians, as applicable) and discuss the steps you will take to help ensure participants' understanding of the elements of informed consent, such as the purposes, benefits and risks of the research. Describe how this information will be provided and how the consent will be collected. For example, describe your use of "plain language" forms, flyers and verbal scripts, and how you plan to work with families with limited English proficiency or primary languages other than English, and with families including persons with disabilities. For assistance in ensuring that persons with limited English proficiency have meaningful access to your research activities, see section III.C.4.c of the FY 2013 **General Section**. For additional information on what constitutes human subject research or how to obtain an institutional assurance see the OHRP website at <http://www.hhs.gov/ohrp/>.

(4) Affirmatively Furthering Fair Housing (AFFH) and Section 3 Requirements (1 point).

(a) AFFH (0.5 points). If your proposed project will confer a benefit to members of the public in which the work is to be done, through hazard intervention that involves construction or rehabilitation of housing (not including routine housing maintenance or minor repair) and/or education or training, then, to receive funding consideration, your application must discuss, in a separate narrative, how your proposed plans affirmatively further fair housing. If, on the other hand, your proposed project entails only laboratory research, conducting surveys, analyzing existing data sets, or other narrowly focused activities, your application need only include a explicit statement (in your narrative response to this sub-factor) to that effect in regard to affirmatively furthering fair housing . If applicable, this narrative must describe how your proposed activities further at least one of the following objectives: {i} help overcome any impediments to fair housing choice related to the assisted program or activity itself; {ii} promote racially, ethnically, and socioeconomically diverse communities; or {iii} promote housing-related opportunities that overcome the effects of past discrimination because of race, color, national origin, religion, sex, disability, and familial status. The narrative must also show how your proposed plans are designed to help overcome the effect of impediments to fair housing choice that are identified in the Analysis of Impediments to Fair Housing Choice ("AI") of the jurisdiction(s) in which the planning occurs, as described in section III.C.4.b of the FY 2013 **General Section**. Federally recognized Indian tribes and their instrumentalities are not required to comply with the requirement to affirmatively further fair housing.

For projects involving construction or rehabilitation, examples of activities that affirmatively further fair housing include those that ensure that existing residents relocated (or temporarily relocated) to facilitate rehabilitation are afforded preference or right of first refusal for new units.

For projects which involve community-based research and/or which include enrollment outreach, education and/or training, examples of activities that affirmatively further fair housing include:

(i) where appropriate, designing and implementing the research study so as to maximize communication and participation with, or dissemination of information to, persons unlikely to have access to the study, including persons of different ethnic and racial

backgrounds, and persons with disabilities;

(ii) to the maximum extent practicable, affirmatively marketing the existence of the study or affirmatively disseminating the results of such studies broadly to persons affected, including persons of different races or ethnicities, persons of different socioeconomic status, or persons with disabilities who are not likely to be aware of the study;

(iii) conducting such activities in a manner that provides meaningful access to persons with limited English proficiency (LEP); and

(iv) targeting the benefits of the research, outreach, or educational activities to vulnerable populations, including, but not limited to, women with children and racial and ethnic minorities.

(b) **Section 3 Requirements (0.5 points).** If your proposed project will conduct housing construction or rehabilitation, explain in a separate narrative how you will provide appropriate opportunities to Section 3 residents and Section 3 businesses of the target area, in compliance with Section 3 of the Housing and Urban Development Act of 1968 (12 U.S.C. § 1701u) and HUD's implementing rules at 24 CFR Part 135 (see section III.C.4.d of the FY 2013 **General Section** for further information).

**(5) Budget Proposal (5 points).**

(a) Your budget proposal should thoroughly estimate all applicable direct and indirect costs, and be presented in a clear and coherent format in accordance with the requirements listed in the FY 2013 **General Section**. HUD is not required to approve or fund all proposed activities. You must thoroughly document and justify all budget categories and costs (Form HUD424CBW) and all major tasks, for yourself, sub-recipients, major subcontractors, joint venture participants, or others contributing resources to the project.

(b) A separate budget must be provided for partners who are proposed to receive more than 10 percent of the federal budget request. Your application will be evaluated on the extent to which your resources are appropriate for the scope of your proposed study.

(c) Your narrative justification associated with these budgeted costs should be submitted as part of the Total Budget (Federal Share and Leveraging), but is not included in the 25-page limit for this submission. The narrative should provide an explanation of the basis for the major budget items. Separate narrative justifications should be submitted for partners that are submitting separate budgets.

(d) The application will not be rated on the proposed cost; however, cost will be considered in addition to the rated factors to identify proposals that are of greatest value to the Federal Government. Cost will be the deciding factor when proposals ranked under the listed factors are considered acceptable and are substantially equal.

**d. Rating Factor 4: Leveraging Resources (6 Points)**

This factor addresses your ability to obtain other resources that can be combined with HUD's funding to increase the effectiveness of the proposed study. To receive points, your proposal should demonstrate that the effectiveness of HUD's Technical Studies grant funds is being increased by securing other resources or by structuring the project in a cost-effective manner, such as integrating the project into an existing study that will be concurrent with your proposed study.

The chart below identifies the points to be provided for monetary leveraging under this rating factor.

Leverage	Points
Less than 1%	0
1% and less than 5%	2
5% and less than 10%	4
10% or more	6

(1) Contributed resources must be shown to be specifically dedicated to and integrated into supporting study activities. Resources may include funding or in-kind contributions (such as direct labor, specialized facilities) allocated to the purpose(s) of your project. Staff and in-kind contributions should be assigned a monetary value. You should be aware that federal sources are generally not allowed to be used for monetary leverage unless otherwise permitted by that specific federal program's authorizing statute. However, HUD will award up to three points to applicants that can demonstrate that the potential impact of the proposed research would be magnified through (non-monetized) integration with existing federally funded research.

(2) In assigning points for monetized leveraging under this factor, HUD will consider the significance of the leveraging in the context of the amount of federal funds that you are requesting. Applicants must propose to contribute resources valued 1% or more of the federal funds requested to receive points. Applicants can receive the maximum points under this factor through monetized leveraging alone or through a combination of monetized leveraging and non-monetized leveraging as described above.

(3) Leveraging from a partner or from outside your organization must be documented with letters of firm commitment, memoranda of understanding, and/or agreements to participate including the monetary value of the contribution. Each document must include the organization's name, proposed level of commitment (with estimated monetary value) and responsibilities as they relate to specific activities or tasks of your proposed program. The commitment letter must also be signed by an official of the organization legally able to make commitments on behalf of the organization. Simple letters that only indicate support of the proposed study are not sufficient and are discouraged.

(4) In responding to this rating factor, you must complete and submit Form HUD-96015 (Leveraging Resources). No points will be awarded to applicants that identify leveraged resources for which adequate documentation is not provided (e.g., a letter of commitment is needed but not provided).

(5) Newly contributed resources, devoted to supporting proposed study activities will be fully credited. Resources included from previous work, previous data bases, or other concurrent work that is not federally funded and which would be completed regardless of this proposed study, will be valued at no more than 25% of their documented cost.

(6) Applicants should make sure that their submittal regarding monetary leveraging is identified and is internally consistent in all the required places, i.e., forms SF424, HUD424CBW (budget), HUD96015, and the signed documentation. If for some reason you are not able to include your monetary leveraging in the budget forms, please provide an explanation as part of your response to this rating factor.

**e. Rating Factor 5: Achieving Results and Project Management (10 Points).** This factor emphasizes HUD's commitment to ensuring that applicants keep promises made in their applications. The performance of successful applicants will be assessed quarterly to ensure that performance goals are met. This factor requires applicants to clearly identify benchmarks and milestones that demonstrate progress in study completion as well as final study outcomes. Applicants must also provide a management plan that indicates how they will ensure timely and successful completion of the study.

(1) Project Management and Tracking Progress

(a) The proposal should include a management plan that provides a schedule for the clear and expeditious completion of all major tasks, with associated benchmarks and major study milestones and deliverables. Benchmarks and important milestones (e.g., completing the recruitment of study participants) should be identified on a quarterly basis in a study timeline. Any interim products should be identified. Successful applicants will be required to enter project benchmarks and milestones into a spreadsheet, which will be used by HUD to track study progress.

(b) Identify the organization/person that will have primary responsibility for completion of each of the major study tasks and indicate plans for ensuring effective communication among members of the study team about goals, methods, progress and timeliness.

(c) In your response you should identify potential obstacles and delays in maintaining your proposed schedule and achieving your study objectives, and discuss steps and adjustments you would take to respond to these potential obstacles and delays and to ensure timely completion of the study.

(d) Include plans and schedules for preparation and submission of a minimum of one manuscript for publication in a peer-reviewed academic journal following HUD acceptance.

Depending on the study's focus, HUD may also accept submission of a manuscript for publication of study findings in one or more high quality professional journals (i.e., if this is considered more appropriate for the focus area than publication in a scientific/academic journal). Where possible, include the name of the journal in which you plan to publish. The final deliverable can be submitted to HUD during the agreed upon period of performance or during the 90-day closeout period following award expiration.

## **B. Reviews and Selection Process:**

**1. Corrections to Deficient Applications.** The **FY 2013 General Section** provides the procedures for correcting deficient applications.

**2. Rating and Ranking.** Awards will be made in rank order within the limits of funding availability for the program; however, for the highest ranked applications that differ in score by one point or less, the Application Review Panel will make the final funding recommendation based on which application(s) it believes address the most critical research needs.

**a. Partial Funding.** In the selection process, HUD reserves the right to offer partial funding to any or all applicants. If you are offered a reduced grant amount, you will have a maximum of

14 calendar days to accept such a reduced award. If you fail to have HUD receive your response within the 14-day limit, you shall be considered to have declined the award.

**b. Remaining Funds.** See the FY 2013 **General Section** for HUD's procedures if funds remain after all selections have been made within either type of Technical Studies Program.

## **VI. AWARD ADMINISTRATION INFORMATION**

### **A. Award Notices:**

**1. Notice of Award.** Applicants who have been selected for award will be notified by letter from the Office of Healthy Homes and Lead Hazard Control Grant Officer. The letter will state the program for which the application has been selected, the amount the applicant is eligible to receive, and the name of the Government Technical Representative (GTR). This letter is not an authorization to begin work or incur costs under the award. An executed cooperative agreement is the authorizing document.

HUD may require that all the selected applicants participate in negotiations to determine the specific terms of the cooperative agreement and budget. If you accept the terms and conditions of the cooperative agreement, you must return your signed cooperative agreement by the date specified during negotiation. In cases where HUD cannot successfully conclude negotiations with a selected applicant or a selected applicant fails to provide HUD with requested information, an award will not be made to that applicant. In this instance, HUD may offer an award, and proceed with negotiations with the next highest-ranking applicant. Applicants should note that, if they are selected for multiple OHHLHC awards, they must ensure that they have sufficient resources to provide the promised leveraging for the multiple awards. During negotiations, applicants selected for multiple awards will be required to provide alternative leveraged resources, if necessary, before the grant can be awarded. This is required in order to avoid committing duplicate leveraged resources to more than one OHHLHC grant.

Awardees will receive additional instructions on how to have the grant account entered into HUD's Line of Credit Control System (LOCCS) payment system or its successor will be provided. Other forms and program requirements will also be provided.

In accordance with OMB Circular A-133 (Audits of States, Local Governments and Non-Profit Organizations), grantees expending \$500,000 in Federal funds within a program or fiscal year must submit their completed audit-reporting package along with the Data Collection Form (SF-SAC) to the Single Audit Clearinghouse, the address can be obtained from their website. The SF-SAC can be downloaded at <http://harvester.census.gov/sac/>.

**2. Debriefing.** Debriefing requests should be submitted via email to the Agency Contact identified in Section VII of this NOFA, following the procedures outlined in the FY 2013 **General Section**.

### **B. Administrative and National Policy Requirements:**

#### **1. Environmental Requirements.**

**a. Eligible Construction and Rehabilitation Activities.** A FY 2013 Healthy Homes Technical Studies award does not constitute approval of specific sites where activities that are subject to environmental review may be carried out. The provisions of section 305(c) of the Multifamily Housing Property Disposition Reform Act of 1994, implemented by HUD regulations at 24 CFR part 58, “Environmental Review Procedures for Entities Assuming HUD Environmental Responsibilities,” are applicable to properties assisted with Healthy Homes Technical Studies funds. Therefore, recipients conducting eligible construction and rehabilitation activities must comply with 24 CFR part 58. Recipients that are States, units of local government or Native American tribes must carry out environmental review responsibilities as a responsible entity under part 58. Recipients who are academic, not-for-profit, or for-profit institutions, must contact and partner with a non-recipient responsible entity, usually the unit of local government or Native American tribe, to assume the environmental review responsibilities for construction or rehabilitation activities funded (in whole or in part) under this NOFA. Reasonable expenses incurred for compliance with these environmental requirements are eligible expenses under this NOFA. Under 24 CFR 58.11, where the recipient is not a State, unit of local government or Native American tribe, if a responsible entity objects to performing the environmental review, or the recipient objects to the responsible entity performing the environmental review, HUD may designate another responsible entity to perform the review or may perform the environmental review itself under the provisions of 24 CFR part 50. When HUD performs the review itself, following grant award execution, HUD will be responsible for ensuring that any necessary environmental reviews are completed. See paragraph b, below for additional assistance.

**b.** For all cooperative agreements under this NOFA, recipients and other participants in the project are prohibited from undertaking, or committing or expending HUD or non-HUD funds (including leveraged funds) on, a project or activities under this NOFA (other than activities listed in 24 CFR 58.34, 58.35(b) or 58.22(f)) until the responsible entity completes an environmental review and the applicant submits and HUD approves a Request for the Release of Funds and the responsible entity’s environmental certification (both on form HUD-7015.15) or, in the case where the recipient is not a State, unit of local government or Native American tribe and HUD performs the environmental review under part 50, HUD has completed the review and notified the grantee of its approval. The results of the environmental reviews may require that proposed activities be modified or proposed sites rejected. For Part 58 procedures, see <http://www.hud.gov/offices/cpd/environment/index.cfm>. For assistance, contact Karen Griego, the Office of Healthy Homes and Lead Hazard Control Program Environmental Clearance Officer at (213) 534-2458 (this is not a toll free-number) or the HUD Environmental Clearance Officer in the HUD Field Office serving your area. If you are a hearing- or speech-impaired person, you may reach the telephone number via TTY by calling the toll-free Federal Relay Service at 1-800-877-8339. Recipients of a grant under this program will be given additional guidance in these environmental responsibilities.

**c.** All other activities not related to construction or rehabilitation activities are categorically excluded under 24 CFR 50.19 (b)(1), (3), (5) and (9) from the requirements of the National Environmental Policy Act of 1969 (42 U.S.C. § 4321) and are not subject to environmental review under the related environmental laws and authorities at 24 CFR 50.4.

**2. Conducting Business in Accordance with HUD Core Values and Ethical Standards.** If awarded assistance under this NOFA, prior to entering into a cooperative agreement with HUD, you will be required to submit a copy of your Code of Conduct and describe the methods you will use to ensure that all officers, employees, and agents of your organization are aware of your Code of Conduct. See the FY 2013 **General Section** for information about conducting business in accordance with HUD's core values and ethical standards.

**3. Participation in HUD-Sponsored Program Evaluation.** See the FY 2013 **General Section**.

**4. HUD Reform Act of 1989.** The provisions of the HUD Reform Act of 1989 that apply to this NOFA are explained in the FY 2013 **General Section**.

**5. Procurement of Recovered Materials.** See the FY 2013 **General Section** for information concerning this requirement.

**6. Davis-Bacon Wage Rates.** The Davis-Bacon wage requirements do not apply to this program. However, if program funds are used in conjunction with other federal programs in which Davis-Bacon prevailing wage rates apply, then Davis-Bacon provisions would apply to the extent required under the other federal programs.

### **C. Reporting:**

**1. Post Award Reporting Requirements:** Final budget and work plans are due 60 days after the start date.

**2. Progress Reporting:** Progress reporting is required on a quarterly basis. Project benchmarks and milestones will be tracked using a benchmark spreadsheet that incorporates the benchmarks and milestones identified in the response to rating factor 5. For specific reporting requirements, see policy guidance at: <http://www-domino5.hud.gov/qprs/qprsr1.nsf>.

**3. Tangible Personal Property Report:** Grant recipients who purchase equipment in excess of \$5,000 apiece must complete the OMB's annual Tangible Personal Property Report, if and after that report receives OMB approval under the Paperwork Reduction Act of 1995 (see 75 Federal Register 14441-14442; March 25, 2011). This report has four components: the Annual Report, the Final (Award Closeout) Report, and the Disposition Report/Request, and, if needed, the Supplemental Sheet (see [http://www.whitehouse.gov/omb/grants\\_forms](http://www.whitehouse.gov/omb/grants_forms)). Generally, the average estimated time to complete each of these components is 0.5 hours; it is likely to be less for this grant program.

**4. Section 3:** Grant recipients covered by Section 3 (see Section III.C.4 of this NOFA) must comply with reporting and record-keeping requirements for Section 3 of the Housing and Urban Development Act of 1968, 12 U.S.C. § 1701u (Economic Opportunities for Low- and Very Low-Income Persons in Connection with Assisted Projects). Those requirements can be found at 24 CFR part 135, subpart E. See section III.C.4.d of the FY 2013 **General Section**.

### **5. Transparency Act Reporting.**

Recipient Reporting to Meet the Requirements the Federal Financial Assistance Accountability

and Transparency Act of 2006 as amended. See Section III.C.4.v. of the FY 2013 **General Section**.

**6. Compliance with Section 872 of the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009 (Pub. L. 110-417), hereafter referred to as “Section 872.”**

Section 872 requires the establishment of a government-wide data system – the Federal Awardee Performance and Integrity Information System (FAPIIS) - to contain information related to the integrity and performance of entities awarded federal financial assistance and making use of the information by federal officials in making awards. OMB is in the process of issuing regulations regarding federal agency implementation of section 872 requirements. A technical correction to this **General Section** may be issued when such regulations are promulgated.

HUD anticipates that the terms and conditions to its FY 2013 awards will contain requirements related to meeting FFATA and Section 872 requirements.

**7. Final Report:** The cooperative agreement will specify the requirements for final reporting (e.g., final technical report and final project benchmarks and milestones achieved against the proposed benchmarks and milestones which were approved and incorporated into your cooperative agreement).

**8. Draft Scientific Manuscript(s):** Grantees will be required to complete a minimum of one draft manuscript for publication in a peer-reviewed journal.

## **VII. AGENCY CONTACTS**

For programmatic questions on the Healthy Homes Technical Studies program, you may contact Dr. Peter Ashley, Office of Healthy Homes and Lead Hazard Control, at 202-402-7595 or via email at [Peter.J.Ashley@hud.gov](mailto:Peter.J.Ashley@hud.gov). For grants administrative questions, you may contact Ms. Nadine Heath, Office of Healthy Homes and Lead Hazard Control, at telephone 202- 402-7680 or via email at [Nadine.L.Heath@HUD.gov](mailto:Nadine.L.Heath@HUD.gov). If you are a hearing- or speech-impaired person, you may reach the above telephone numbers through TTY by calling the toll-free Federal Relay Service at 1-800-877-8339.

## **VIII. OTHER INFORMATION**

**A. Other Office of Healthy Homes and Lead Hazard Control Information:** For additional general, technical, and grant program information pertaining to the Office of Healthy Homes and Lead Hazard Control, visit <http://www.hud.gov/offices/lead/>.

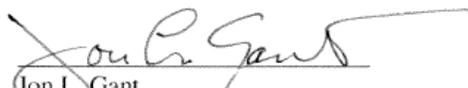
**B. Paperwork Reduction Act:** The information collection requirements contained in this document have been approved by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. §§ 3501-3520) and assigned OMB control number 2539-0015. In accordance with the Paperwork Reduction Act, HUD may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the collection displays a currently valid OMB control number. Public reporting burden for the collection of information is estimated to average 80 hours per respondent for the application and 16 hours to finalize the cooperative agreement. This includes the time for collecting, reviewing, and reporting the data for the application. This information will be used for grantee

selection. The reporting burden for completion of the Quality Assurance Plan by applicants who are awarded a grant is estimated at 24 hours per grantee. Response to this request for information is required in order to receive the benefits to be derived.

**C. Environmental:** A Finding of No Significant Impact (FONSI) with respect to the environment has been made for this NOFA in accordance with HUD regulations at 24 CFR Part 50, which implement section 102(2)(C) of the National Environmental Policy Act of 1969 (42 U.S.C. 4332(2)(C)). The FONSI will be posted at HUD's funds available page at [http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/administration/grants/fundsavail](http://portal.hud.gov/hudportal/HUD?src=/program_offices/administration/grants/fundsavail) under the FY 2013 Programs section with the Healthy Homes Technical Studies Grant Program issued under this NOFA.

**Appendices:** Appendices A and B to this NOFA are available for downloading with the application at <http://www.Grants.gov>.

1 / 3 / 13  
Date

  
Jon L. Gant  
Director, Office of Healthy Homes and  
Lead Hazard Control

[FR-5700-N-12]

## FY 2013 Healthy Homes Technical Studies

### Notice of Funding Availability

#### APPENDIX A – Key Residential Health and Safety Hazards

The following briefly describes the residential health and injury hazards HUD considers key targets for intervention:

**1. Allergens and Asthma:** In 2005, the CDC estimated that over 22.2 million Americans have asthma with an associated annual cost of more than \$13 billion. Asthma is now recognized as the leading cause of school and work absences, emergency room visits, and hospitalizations. For sensitized children, exposure to antigens from dust mites, certain pets, and cockroaches has been associated with more severe asthma. There is a preponderance of evidence showing a dose-response relationship between exposure and prevalence of asthma and allergies; some evidence also indicates that exposure to antigens early in life may predispose or hasten the onset of allergies and asthma. Dust mites have been identified as the largest trigger for asthma and allergies. A recently published study of children with atopic (allergic) asthma from seven major U.S. cities reported that over half of the children were allergic to cockroach and dust mite allergen (approximately 70% and 63%, respectively), with approximately 50% of the children allergic to mold (Morgan et al. 2004). Significant fractions of children also tested positive for allergy to cat, rodent and dog allergens. This is consistent with other studies that have found that cockroach tends to be the dominant allergen among asthmatic children living in the inner-city, whereas allergy to dust mite allergens appears to dominate among children living in most suburban environments. While children are the population most at risk for developing asthma, there is a growing need to address the onset of new cases in older adults, and to examine how their risk factors might differ from those of children (Selgrade et al. 2006).

HUD-funded researchers recently reported a significant association between a measure of mold exposure (i.e., an index composed of DNA-based measurement of specific fungi in house dust samples) during the 1<sup>st</sup> year of life and the diagnosis of asthma at age 7 (Reponen et al., 2011). In a follow-up paper, the researchers identified three specific mold species that were significantly associated with asthma development among the study cohort at age 7 (Reponen et al., 2102).

Interventions known to have beneficial effects include the installation of impervious mattress and pillow covers, which can reduce allergen exposure by 90 percent. Other dust mite control measures include dehumidification, laundering bedding in hot water, specialized cleaning (dry steam or use of a HEPA vacuum), and removal of carpets and other materials that accumulate dust and are difficult to clean (e.g., dust sinks). Providing residents with education and instruction on cleaning with repeat visits by outreach workers has been shown to result in significant reduction in levels of dust mite and cockroach allergens in floor dust (Takaro et al. 2004; Morgan et al. 2004). For these same studies, researchers also reported significant reductions in asthma symptoms among children living in the intervention group when compared

to the control group. A recent meta-analysis found that dust control interventions can also have a preventative effect. Based on five longitudinal studies, the researchers reported an approximately twenty percent decrease in risk of physician-diagnosed asthma for individuals in homes with dust control interventions, compared to those in control homes (Russell et al. 2007).

Interventions emphasizing the mitigation of mold and moisture problems in the homes of asthmatic children have also been shown to be effective. In one HUD-supported study, asthmatic children living in homes in which nontrivial mold growth was identified, were randomized into two groups, with one group receiving interventions to address the residential mold/moisture problems. The remediation group showed statistically significant reductions in symptom days, symptom score, and the need for acute care (Kercsmar et al. 2006). The mean cost of home interventions was \$3,458 per home, including the cost of addressing lead-based paint hazards.

Moving families with an asthmatic child into new housing designed to reduce exposure to asthma triggers has also been shown to be effective. HUD-supported research conducted by Takaro et al. (2010) demonstrated improvements in asthma symptoms and other indicators for subjects who lived in asthma-friendly Breathe-Easy Homes in addition to receiving traditional in-home asthma education and outreach. Breathe-Easy Homes address multiple asthma triggers by incorporating comprehensive enhancements into the physical structure, including moisture-reduction features, low dust-generating and chemical-emitting finishes, and advanced fresh-air ventilation systems. The authors reported significant improvements in primary (e.g., symptom-free days, FEV<sub>1</sub>) and secondary (days rescue medicine used, nights with symptoms) outcomes among BEH occupants.

**2. Asbestos:** Asbestos is a mineral fiber that has been used commonly in a variety of building construction materials and household products for insulation and as a fire-retardant. The Environmental Protection Agency (EPA) and the Consumer Product Safety Commission (CPSC) have banned most asbestos products. Manufacturers have also voluntarily limited uses of asbestos. Today, asbestos is most commonly found in older homes in pipe and furnace insulation materials, asbestos shingles, millboard, textured paints and other coating materials, and floor tiles. Elevated concentrations of airborne asbestos can occur when asbestos-containing materials (ACMs) are disturbed by cutting, sanding or other remodeling activities. Improper attempts to remove these materials can release asbestos fibers into the air in homes, increasing asbestos levels and endangering the people living in those homes. The most dangerous asbestos fibers are too small to be visible. After they are inhaled, they can remain and accumulate in the lungs. Asbestos can cause lung cancer, mesothelioma (a cancer of the chest and abdominal linings), and asbestosis (irreversible lung scarring that can be fatal). Most people with asbestos-related diseases were exposed to elevated concentrations on the job; some developed disease from exposure to clothing and equipment brought home from job sites. As with radon, dose-response extrapolations suggest that lower level exposures, as may occur when asbestos-containing building materials deteriorate or are disturbed, may also cause cancer.

Intact asbestos-containing materials are not a hazard; they should be monitored for damage or deterioration and isolated if possible. Repair of damaged or deteriorating ACMs usually involves either sealing (encapsulation) or covering (enclosure) it. Repair is usually cheaper than removal,

but it may make later removal of asbestos more difficult and costly. Repairs should only be done by a trained professional certified to handle asbestos safely and can cost from a few hundred to a few thousand dollars; removal can be more expensive.

**3. Combustion Products of Heating and Cooking Appliances:** Burning of oil, natural gas, kerosene, and wood for heating or cooking purposes can release a variety of combustion products of health concern. Depending upon the fuel, these may include carbon monoxide (a chemical asphyxiant), oxides of nitrogen (respiratory irritants), polycyclic aromatic hydrocarbons (e.g., the carcinogen benzo[a]pyrene), and airborne particulate matter. Exposure to carbon monoxide, an odorless gas, can be fatal. Nitrogen dioxide can irritate or damage the respiratory tract, and sulfur dioxide can irritate the eyes, nose and respiratory tract. Improper venting and poor maintenance of heating systems and cooking appliances can dramatically increase exposure to combustion products. As the principles of “green” construction and rehabilitation become more popular, and homes become increasingly airtight to improve energy efficiency, there are concerns about potential indoor air quality trade-offs (Selgrade et al. 2006).

Experts recommend having combustion heating systems inspected by a trained professional every year to identify blocked openings to flues and chimneys, cracked or disconnected flue pipes, dirty filters, rust or cracks in the heat exchanger, soot or creosote build-up, and exhaust or gas odors. Installing a carbon monoxide detector is also recommended; however, such a detector will not detect other combustion by-products.

**4. Environmental Tobacco Smoke (ETS):** ETS (also known as secondhand smoke) results from the combustion of tobacco products and exhalation of inhaled tobacco smoke by active smokers. Tobacco smoke contains as many as 7000 individual compounds, including formaldehyde, carbon monoxide, nicotine, nitrosamines and polyaromatic hydrocarbons, with nearly 70 compounds identified as carcinogens (US DHHS, 2010; IARC, 2004). Exposure to ETS has been associated with numerous adverse health effects, including multiple types of cancer, coronary heart disease, asthma, respiratory tract infections and others. Additionally, exposure to ETS has been estimated to cause approximately 50,000 excess deaths annually in the U.S., including sudden infant death syndrome (Cal EPA, 2005). Children are particularly vulnerable to the effects of SHS. The U.S. Surgeon General’s office reported that approximately 22 million children may be exposed to ETS in the U.S. (US DHHS, 2006).

Exposure to ETS can be a problem even in rooms or units where smoking does not occur. Van Deusen et al. (2009) reported that levels of particulate matter (an indicator of tobacco smoke) were elevated in rooms within a home that were distant from the primary room where smoking occurred. In addition, ETS also migrates between units in multi-unit buildings. Kraev et al. (2009), measured nicotine in air and air exchange rates in individual units of a lower-income multi-unit building in the Boston area and found measurable levels of nicotine in units where no smoking occurred; King et al. (2010) reported similar results in nonsmoking units and hallways as part of a study in Buffalo. Wilson et al. (2010) analyzed measurements of cotinine exposure in children (an indicator of ETS exposure) and found that those living in multifamily housing had higher levels than children in detached housing, indicating the contribution from ETS migrating between units of multifamily housing.

**5. Infiltration of Ambient Pollutants:** Personal exposure to airborne contaminants is a function of indoor and outdoor exposures. For people living in areas that are near roadways or a point source generating hazardous pollutants, for example, the infiltration of ambient pollutants has the potential to dominate personal exposures. Logue et al. (2010, 2011) identified a number of pollutants that present significant health risks in indoor environments; however, many of those pollutants are found also in the ambient environment suggesting infiltration of ambient air pollution may be of concern when identifying exposure risks to occupants of a home. Meng et al. (2009) reported in the RIOPA study across three U.S. cities that approximately 60% of indoor PM<sub>2.5</sub> originated from the outdoors. Allen et al. (2012) identified the frequency of air conditioner use and the opening of windows as predictors of ambient pollution infiltration during the summer months, while temperature and the use of forced air heat were predictors during winter months. Studies on practical control technologies and to reduce the infiltration of outdoor air pollutants into homes are needed.

**6. Insect and Rodent Pests:** The observed association between exposure to cockroach antigen and asthma severity has already been noted above. In addition, cockroaches may act as vehicles to contaminate environmental surfaces with certain pathogenic organisms. Rodents can transmit a number of communicable diseases to humans, either through bites, arthropod vectors, or exposure to aerosolized excreta. In addition, humans can become sensitized to proteins in rodent urine, dander and saliva. Such sensitization may contribute to asthma severity among sensitized individuals. Insect and rodent infestation is frequently associated with substandard housing that makes it difficult to eliminate. Treatment of rodent and insect infestations often includes the use of toxic pesticides that may present hazards to occupants (see below). Integrated pest management (IPM) for rodents and cockroaches is recommended by federal agencies, including the U.S. EPA, HUD, and the Center for Disease Control and Prevention (CDC) because it minimizes the use of toxic pesticides and instead emphasizes environmental controls such as elimination of harborages, and removing access to food and water. This recommendation was recently confirmed by an expert panel that systematically reviewed the literature on this topic (Sandel et al., 2010). According to the expert panel, sufficient evidence was available to support the implementation of an IPM approach as a way of reducing pesticide residues in the home. A reduction in residential pesticide exposure subsequently would ultimately lead to a reduction in the prevalence of pesticide-associated health issues.

**7. Lead-Based Paint and its Hazards:** Exposure to lead, especially from deteriorating lead-based paint, remains one of the most important and best-studied of the household environmental hazards to children. Although blood lead levels (BLLs) have fallen nationally, a large reservoir of lead remains in housing. Recent results from CDC's Fourth National Health and Nutrition Examination Survey (NHANES 2002) demonstrate that the national geometric mean blood lead concentration of children aged 1-5 years has decreased from 2.3 g/dL in 1991 to 1.6 g/dL in the period 1999-2002 (CDC 2005). During the 1999-2002 survey period, children aged 1-5 years had the highest prevalence of elevated BLLs (1.6%), so that approximately 310,000 children aged 1-5 years remained at risk for exposure to harmful lead levels. Overall, by race/ethnicity, non-Hispanic blacks and Mexican Americans had higher percentages of elevated BLLs (1.4% and 1.5%, respectively) than non-Hispanic whites (0.5%). Among subpopulations, non-Hispanic blacks aged 1-5 years and aged >60 years had the highest prevalence of elevated BLLs (3.1% and 3.4%, respectively). As BLLs have dropped over the years, recent analyses have examined

the relationship between relatively low blood lead concentrations (<10 g/dL) and cognitive functioning in representative samples of U.S. children and adolescents, and have found evidence that suggests that deficits in cognitive and academic skills associated with lead exposure have no threshold (Lanphear et al., 2000; Canfield et al. 2003). These findings clearly support the importance of primary prevention with respect to childhood lead exposure.

Despite dramatic reductions in blood lead levels over the past 15 years, lead poisoning continues to be a significant health risk for young children. Based on results from the HUD- and NIEHS-funded National Survey of Lead and Allergens in Housing (Jacobs et al., 2002), it is estimated that approximately 40 percent of housing units (38 million) in the United States contain lead-based paint. It is further estimated that 25 percent of the nation's housing stock (24 million housing units) have one or more significant lead-based paint hazards (i.e., deteriorated lead-based paint, lead-contaminated dust, or lead-contaminated soil). 1.2 million housing units were found to pose the highest risk of lead poisoning because they housed low-income families with children less than six years of age.

Among HUD grantees, lead hazard control (LHC) costs tend to range from \$500 to \$15,000 per unit, with a median cost of \$5,960. Corrective measures include paint stabilization, enclosure and removal of certain building components coated with lead paint, cleanup and "clearance testing," which ensures the unit is safe for young children. In addition, acute injuries to children have been well documented, most notably in instances involving sanding or stripping of lead-based paint or visible deterioration of lead-based painted residential building components combined with children who exhibit pica tendencies.

Evaluation of lead hazard control interventions conducted by recipients of HUD's lead hazard control grants found that interventions were effective in significantly reducing pre-intervention dust-lead levels on floors and window surfaces up to six years following intervention (Wilson et al. 2006). More intensive treatments were found to significantly reduce dust lead loadings on window sills and troughs compared to lower level treatments, however, no significant differences in dust-lead loadings on floors were reported. Sandel et al. (2010) confirmed these general findings, citing that lead hazard control interventions were effective in reducing exposures to lead exposures. The authors concluded that the evidence was sufficient to promote lead hazard control interventions as a means of reducing lead exposure and associated health effects, particularly in children.

**8. Mold and Moisture:** An analysis of several pulmonary disease studies estimates that 25 percent of airways disease, and 60 percent of interstitial lung disease may be associated with moisture in the home or work environment. Moisture is a precursor to the growth of mold and other biological agents, which is also associated with respiratory symptoms. An investigation of a cluster of pulmonary hemosiderosis (PH) cases in infants showed PH was associated with a history of recent water damage to homes and with levels of the mold *Stachybotrys atra* (SA) in air and cultured surface samples, although this association could not be considered a causal relationship. Associations between exposure to SA and "sick building" symptoms in adults have also been observed. Other related toxigenic fungi have been found in association with SA-associated illness and could play a role. For sensitive individuals, exposure to a wide variety of common molds may also aggravate asthma. A review by an expert committee convened by the

Institute of Medicine found sufficient evidence for an association between exposure to mold and other agents in damp indoor environments and asthma symptoms in sensitized persons, upper respiratory tract symptoms, cough, and wheeze (IOM 2004). The committee also found limited or suggestive evidence for an association between damp indoor environments and the development of asthma.

Addressing mold problems in housing requires coordination among the medical, public health, microbiological, housing, and building science communities. Krieger et al., (2010) report that an expert panel review of relevant literature on this topic found that a combined approach of eliminating active leaks and moisture intrusion into the home while also removing moldy items already in place was an effective intervention strategy for reducing exposure to mold and associated respiratory health effects. The panel concluded that there was sufficient evidence to support implementation of a coordinated intervention strategy for mold and moisture problems.

The cost of mold/moisture-related intervention work (e.g., IPM, clean and tune furnace, remove debris, vent clothes dryer, cover dirt floor with impermeable vapor barrier) is a few hundred dollars, unless major modification of the ventilation system or structural repairs is needed. For example, in Cleveland, mold interventions, including repairs to ventilation systems and basement flooring, in the most heavily contaminated homes range from \$500 to \$5,000, with some costs also being dedicated to LHC simultaneously through its lead and asthma program.

**9. Pesticide Residues:** According to the EPA, 75 percent of U.S. households used at least one pesticide product indoors during the past year. Products used most often are insecticides and disinfectants. Another study suggests that 80 percent of most people's exposure to pesticides occurs indoors and that measurable levels of up to a dozen pesticides have been found in the air inside homes. The amount of pesticides found in homes appears to be greater than can be explained by recent pesticide use in those households; other possible sources include contaminated soil or dust that migrates in from outside, stored pesticide containers, and household surfaces that collect and then release the pesticides. Pesticides used in and around the home include products to control insects (insecticides), termites (termiticides), rodents (rodenticides), molds and fungi (fungicides), and microbes (disinfectants). In 2005, the American Association of Poison Control Centers reported that some 1.6 million children were involved in common household pesticide poisonings or exposures (AAPCC 2005). In households with children less than five years of age, almost half stored at least one pesticide product within the reach of children. Exposure to high levels of cyclodiene pesticides, commonly associated with misapplication, has produced various symptoms, including headaches, dizziness, muscle twitching, weakness, tingling sensations, and nausea. In addition, the EPA is concerned that cyclodienes might cause long-term damage to the liver and the central nervous system, as well as an increased risk of cancer. A recent expert panel review (Sandel et al., 2010) found that implementation of an integrated pest management approach was an effective intervention for reducing pesticide residues in the home and should be implemented in lieu of pesticide application for reducing pests.

There are available data on hazard evaluation methods and remediation effectiveness regarding pesticide residues in the home environment.

**10. Radon:** The National Academy of Sciences estimates that approximately 15,000 cases of lung cancer per year are related to radon exposure. Epidemiologic studies of miners exposed to high levels of radon in inhaled air have defined the dose response relation for radon-induced lung cancer at high exposure levels. Extrapolation of these data has been used to estimate the excess risk of lung cancer attributable to exposure to radon gas at the lower levels found in homes. These estimates indicate that radon gas is an important cause of lung cancer deaths in the U.S. Excessive exposures are typically related to home ventilation, structural integrity and location.

Radon measurement and remediation methods are well developed, and the EPA recommends that every home be measured for radon. Sandel et al. (2010) conducted a review of the literature and concluded that active soil depressurization beneath the foundation of the structure was an effective method for reducing radon exposures in the home. EPA estimates that materials and labor costs for radon reduction in an existing home are \$800-\$2,500. Including radon resistant techniques in new home construction costs \$350-\$500, and can save up to \$65 annually in energy costs, according to the EPA.

**11. Semi-Volatile Organic Compounds (SVOCs):** Several SVOCs are emerging as potential health risks in the home due to their ubiquitous nature in consumer and building products that are produced in high volume and used worldwide. SVOCs exist partially in the gas-phase and emit their respective chemical gradually over time, particularly in the presence of increased temperatures. Two compounds of increasing concern are phthalates and polybrominated diphenyl ethers (PBDE). During recent years, phthalate and PBDE compounds have received increased scrutiny due to their potential cumulative health risks and increased use in consumer products. PBDE are found in flame retardants, plasticizers, flexible foams and may also be found in children's products. Phthalates are used as plasticizers and are most notable for their use in children's products, such as teething rings, food contact items and other flexible polyvinyl chloride (PVC)-based products. The health effect most widely associated with phthalates exposures are reproductive effects, while PBDE have shown toxicity potential in liver, thyroid and neurodevelopment systems.

Exposure to phthalates may occur via many different routes – inhalation, ingestion, water, soil – and may occur in various environments from the home to a place of work. Children are reported to have the highest exposures to phthalates among all age groups (CDC, 2005), along with lower socioeconomic status households (Zota et al., 2008). Both phthalates and PBDE have been found in house dust; exposure to dust has been reported as the primary route of exposure for PBDE (Wilford et al., 2005; Zota et al., 2008). The presence of both phthalates and PBDE in house dust presents potential risks particularly to young children. Several house characteristics, including older age of house, water leakage and use of PVC in flooring materials, have been identified as significant indicators for potential phthalates exposures (Bornehag et al., 2005).

The increased concern over phthalates and PBDE has led to increased regulatory scrutiny. In 2008, the U.S. Consumer Product Safety Commission issued a prohibition on the use of several phthalate compounds above threshold levels in children's toys and items used for childcare. Furthermore, PBDE have been banned at the state level, including in California and Washington.

**12. Take-Home Hazards from Work/Hobbies and Work at Home:** When the clothing, hair, skin, or shoes of workers become contaminated with hazardous materials in the workplace, such contaminants may inadvertently be carried to the home environment and/or an automobile. Such "take-home" exposures have been demonstrated, for example, in homes of lead-exposed workers. In addition, certain hobbies or workplaces located in the home may provide an especially great risk of household contamination.

Control methods include storing and laundering work clothes separately, and showering and changing clothes before leaving work or immediately after arriving home. Once a home becomes contaminated, cleaning floors and contact surfaces and replacing furnishings may be necessary to reduce exposures.

**13. Thirdhand Smoke (THS):** Adverse health effects from exposure to active smoking and passive smoking (ETS or secondhand smoke) are well documented. Tobacco smoke contains as many as 7000 individual compounds, including formaldehyde, carbon monoxide, nicotine, nitrosamines and polyaromatic hydrocarbons, with nearly 70 compounds identified as carcinogens (US DHHS, 2010; IARC, 2004). Thirdhand smoke refers to residual pollutants originating from tobacco smoke that persist in dust and adsorb onto surfaces, ultimately re-emitting pollutants into the gaseous phase over time after the smoke has dissipated (Hoh et al., 2012). Pollutants that are re-emitted also have the potential to interact with the local atmosphere resulting in physical and chemical transformation of original contaminants into secondary pollutants, some of which may be more hazardous than the original pollutant (Matt et al., 2011). HUD-funded research also found that the presence of smokers in a home was a significant predictor of both children's blood-lead levels and surface dust-lead loading (Dixon et al., 2009; Gaitens et al., 2009). Exposure to THS occurs most often by inhalation, but may also occur through ingestion of contaminated dust, or through dermal contact with surfaces that have residual contamination. While this is an emerging area of research with relatively sparse information to date, there is initial evidence to suggest that THS may be a concern, particularly for children who have a higher frequency of hand-to-mouth activity that might increase their exposure by ingestion and dermal routes, in addition to inhalation. Matt et al. (2010) reported that THS residue persisted in homes even after they had been cleaned and prepared for the next tenant.

**Unintentional Injuries/Fire:** In 1997, nearly 7 million persons in the U.S. were disabled for at least one full day by unintentional injuries received at home; for children younger than 15 years of age, unintentional injury is now the leading cause of death and disability. A recent HUD-supported study of deaths among US children and adolescents from 1985 to 1997 found that an average of 2,822 unintentional deaths occurred annually from residential injuries (Nagaraja et al., 2005). The highest death rates were attributable to fires, submersion or suffocation, and poisoning. Black children were two times more likely to die from residential injuries than white children. The elderly are also at an elevated risk for residential injuries. Home visitation protocols have been shown to be effective in reducing exposure to injury hazards. The "add-on" cost of injury prevention measures, when combined with other housing interventions are estimated at about \$100 per unit. This includes the cost of some injury prevention devices (e.g., smoke alarms, electrical socket covers, etc.). DiGiuseppi et al. (2010) reported on an expert panel review of seventeen interventions intended to reduce injuries due to residential

deficiencies. Installed and properly working smoke detectors were determined to be an effective intervention that should be implemented for reducing fire-related injuries. This panel deemed four-sided pool enclosures efficacious and pre-set safe hot waters heaters sufficient for reducing residential-based injuries.

[FR-5700-N-12]

**FY 2013 Healthy Homes Technical Studies**

**Notice of Funding Availability**

**APPENDIX B -- Relevant Publications, Guidelines and Other Resources**

The sources below are provided for informational purposes only. By inclusion in this Appendix, HUD is not necessarily endorsing any of the research, findings, or policies. To secure any of the documents listed, call the telephone number provided. If you are a hearing-or speech-impaired person, you may reach the telephone numbers through TTY by calling the toll-free Federal Relay Service at 800-877-8339. A number of these references are provided on HUD's CD, "Residential Lead Desktop Reference, 3rd Edition." This CD can be obtained at no charge by calling the National Lead Information Clearinghouse's (NLIC's) toll free number, 800-424-LEAD. Several of these references can be downloaded from the Internet without charge from the HUD Office of Healthy Homes and Lead Hazard Control's Internet site, [www.hud.gov/offices/lead](http://www.hud.gov/offices/lead).

**A. REGULATIONS:**

**1. Worker Protection:** Occupational Safety and Health Administration (OSHA) publications listed below can be purchased by calling either OSHA Regulations at 202-693-1888 (OSHA Regulations) (this is not a toll-free number) or the Government Printing Office (GPO) at 202-512-1800 (this is not a toll-free number). OSHA standards and other publications can be downloaded or purchased (as applicable) from OSHA's publication web page, <http://www.osha.gov/pls/publications/pubindex.list>. A broad range of information on construction and other worker protection requirements and guidelines is available from OSHA's home page, <http://www.osha.gov/> and from <http://www.osha.gov/SLTC/lead/>.

**2. Waste Disposal.** A copy of the EPA regulations at 40 CFR parts 260-268 can be purchased by calling 800-424-9346, or, from the Washington, DC, metropolitan area, 703-412-9810 (this is not a toll-free number). The regulations can also be downloaded without charge from the EPA website at <http://www.epa.gov/lead/pubs/fslbp.htm>.

**3. Lead.**

(a) Requirements for Lead-Based Paint Activities in Target Housing and Child-Occupied Facilities; Final Rule: 40 CFR part 745 (EPA) (Lead Hazard Standards, Work Practice Standards, EPA and State Certification and Accreditation Programs for those engaged in lead-based paint activities) can be purchased by calling the Toxic Substances Control Act (TSCA) Assistance Service at 202-554-1404 (this is not a toll-free number). The rule and guidance can be downloaded from the Internet without charge at <http://www.epa.gov/lead/pubs/leadcert.htm>.

(b) Requirements for Notification, Evaluation and Reduction of Lead-Based Paint Hazards in Federally Owned Residential Property and Housing Receiving Federal Assistance; Final Rule:

24 CFR part 35, subparts B through R, published September 15, 1999 (64 FR 50201) (HUD) can be purchased by calling the NLIC's toll-free number (800-424-LEAD) or downloaded without charge from the HUD website at

<http://www.hud.gov/offices/lead/library/enforcement/LSHRFinal21June04.pdf>.

(c) Requirements for Disclosure of Information Concerning Lead-Based Paint in Housing, 24 CFR Part 35, Subpart A (HUD, Lead-Based Paint Disclosure Rule) by calling the NLIC's toll-free number (800-424-LEAD). The rule, guidance, pamphlet and disclosure formats can be downloaded from the HUD website at

[http://www.hud.gov/offices/lead/library/enforcement/24CFR35\\_SubpartA.pdf](http://www.hud.gov/offices/lead/library/enforcement/24CFR35_SubpartA.pdf).

(d) U.S. Environmental Protection Agency. Lead; Identification of Dangerous Levels of Lead; Final Rule at 66 FR 1205-1240 (January 5, 2001). This rule and guidance can be obtained without charge by calling the NLIC's toll-free number (800-424-LEAD) or by calling the TSCA Assistance Service at: 202-554-1404 (this is not a toll-free number). The rule and guidance can be downloaded from the EPA website at <http://www.epa.gov/lead/pubs/leadhaz.htm>.

(e) U.S. Environmental Protection Agency. Lead; Renovation, Repair, and Painting Program; Final Rule at 73 FR 21692- 21769 (April 22, 2008). As of April 22, 2011, the rule was fully implemented. This rule and guidance can be obtained without charge by calling the NLIC's toll-free number (800-424-LEAD) or by calling the TSCA Assistance Service at: 202- 554-1404 (this is not a toll-free number). The rule and guidance can be downloaded from the EPA website at <http://www.epa.gov/lead/pubs/renovation.htm>.

## **B. GUIDELINES AND OTHER RESOURCES:**

### **1. Lead**

*Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*; HUD. The Guidelines can be downloaded from the HUD website without charge at

<http://www.hud.gov/offices/lead/lbp/hudguidelines/index.cfm>.

Preventing Lead Poisoning in Young Children; Centers for Disease Control, August, 2005. These guidelines can be obtained without charge by calling the CDC toll free number at 888-232-6789. The guidelines can also be downloaded from

<http://www.cdc.gov/nceh/lead/publications/PrevLeadPoisoning.pdf>.

Screening Young Children for Lead Poisoning: Guidance for State and Local Public Health Officials, November 1997; Centers for Disease Control and Prevention (CDC). These guidelines can be obtained without charge by calling the CDC toll free number at 888-232-6789 or they can be downloaded from <http://www.cdc.gov/nceh/lead/publications/screening.htm>.

### **2. Green Building**

American Lung Association of the Upper Midwest. *Health House Builder Guidelines*. Available: <http://www.healthhouse.org/build/2008HHbuilderguidelines.pdf>.

U.S. Department of Energy. *Builders Challenge: Requirements for Builders*. Available: <http://www1.eere.energy.gov/buildings/challenge/requirements.html>.

Enterprise Community Partners. *Green Communities Criteria*. Available: <http://www.greencommunitiesonline.org/>.

National Association of Home Builders. *Green Building Program*. Available: <http://www.nahbgreen.org/>.

U.S. Environmental Protection Agency. *Indoor air PLUS Program*. Available: <http://www.epa.gov/indoorairplus/>.

U.S. Green Building Council. *LEED for Homes*. Available: <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=147>.

## C. **REPORTS:**

### 1. **Lead**

Putting the Pieces Together: Controlling Lead Hazards in the Nation's Housing, (Summary and Full Report); HUD, July 1995. A copy of this summary and report can be purchased by calling 800-245-2691 toll free or downloaded from <http://archives.hud.gov/funding/2005/appendices/appendixc-hhd.doc>.

President's Task Force on Environmental Health Risks and Safety Risks to Children. *Asthma and The Environment: An Action Plan to Protect Children*. Washington, DC 1999.

Preventing Lead Poisoning in Young Children, A Statement by the Centers for Disease Control and Prevention, Atlanta, GA, August, 2005. This can be downloaded from the Internet without charge at <http://www.cdc.gov/nceh/lead/publications/prevleadpoisoning.pdf>.

### 2. **Healthy Homes**

Healthy Housing Reference Manual; HUD/CDC, 2006. A copy of this manual can be downloaded from the CDC website without charge at <http://www.cdc.gov/nceh/publications/books/housing/housing.htm>.

The Healthy Homes Initiative: A Preliminary Plan (Summary and Full Report); HUD, July 1995. A copy of this summary and report can be downloaded from the HUD website without charge at [www.hud.gov/offices/lead](http://www.hud.gov/offices/lead).

Institute of Medicine. *Damp Indoor Spaces and Health*. The National Academies Press. Washington, D.C. 2004.

Institute of Medicine. *Indoor Allergens. Assessing and Controlling Adverse Health Effects*. The National Academies Press. Washington, D.C. 1993.

National Research Council and the Institute of Medicine. *Ethical Considerations for Research on Housing-Related Health Hazards Involving Children*. The National Academies Press. Washington, D.C. 2005.

Natural Resources Defense Council. *Our Children at Risk*. Washington, D.C. 1997. This can be ordered from the Internet from [www.nrdc.org](http://www.nrdc.org).

Pleis Jr., Lucas JW, Ward BW. *Summary health statistics for U.S. adults: National Health Interview Survey, 2008*. National Center for Health Statistics. Vital Health Stat 10(242). 2009.

Bloom B, Cohen RA, Freeman G. *Summary health statistics for U.S. children: National Health Interview Survey, 2008*. National Center for Health Statistics. Vital Health Stat 10(244). 2009.

U.S. Department of Health and Human Services. *How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2010.

U.S. Department of Health and Human Services. U.S. Department of Health and Human Services. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2006.

U.S. Environmental Protection Agency. 2009. Phthalates Action Plan. [http://www.epa.gov/oppt/existingchemicals/pubs/actionplans/phthalates\\_ap\\_2009\\_1230\\_final.pdf](http://www.epa.gov/oppt/existingchemicals/pubs/actionplans/phthalates_ap_2009_1230_final.pdf). Accessed August 4, 2011.

California Environmental Protection Agency. 2005. *Proposed Identification of Environmental Tobacco Smoke as a Toxic Air Contaminant. Part B: Health Effects*. Sacramento

(CA): California Environmental Protection Agency, Office of Environmental Health Hazard

Assessment.

CDC. 2005. Centers for Disease Control and Prevention. *Third National Report on Human Exposure to Environmental Chemicals*. <http://www.cdc.gov/exposurereport/>. July 2005.

International Agency for Research on Cancer. *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: Tobacco Smoke and Involuntary Smoking*. Vol. 83. Lyon (France): International Agency for Research on Cancer, 2004.

#### **D. PAPERS**

Allen RW, Adar SD, Avol E, Cohen M, Curl CL, Larson T, Liu LJ, Sheppard L, Kaufman JD.

2012. *Modeling the residential infiltration of outdoor PM(2.5) in the Multi-Ethnic Study of Atherosclerosis and Air Pollution (MESA Air)*. Environ Health Perspect. 120(6):824-30.

Binns HJ, Gray KA, Chen T, Finster ME, Peneff N, Schaefer P, Ovsey V, Fernandes J, Brown M, Dunlap B. 2004. *Evaluation of landscape coverings to reduce soil lead hazards in urban residential yards: The safer yards project*. Environ Res. 96(2): 127-38.

Bornehag CG, Lundgren B, Weschler CJ, Sigsgaard T, Hagerhed-Engman L, Sundell J. 2005. *Phthalates in indoor dust and their association with building characteristics*. Environ Health Perspect 113(10):1399-404.

Canfield RL, Henderson CR, Cory-Slechta DA, Cox C, Jusko TA, Lanphear BP. 2003. *Intellectual impairment in children with blood lead concentrations below 10 g per deciliter*. N Engl J Med. 348: 1517-26.

Centers for Disease Control and Prevention, *Blood Lead Levels – United States, 1999-2002*, Morbidity and Mortality Weekly Reports, 2005, Can be accessed on the web at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5420a5.htm>.

Digenis-Bury EC, Brooks DR, Chen L, Ostrem M, Horsburgh CR. 2008. *Use of a Population-Based Survey to Describe the Health of Boston Public Housing Residents*. Amer. J. Pub. Health, 98(1): 85-91.

DiGuseppi C, Jacobs DE, Phelan KJ, Mickalide AD, Ormandy D. 2010. *Housing interventions and control of injury-related structural deficiencies: a review of the evidence*. J Public Health Manag Pract. 16(5 Suppl):S34-43.

Dixon SL, Gaitens JM, Jacobs DE, et al. 2009. *Exposure of U.S. children to residential dust lead, 1999-2004: The contribution of lead-contaminated dust to children's blood lead levels*. 117(4): Environ Health Perspect. 461-467.

Gaitens, JM, Dixon, SL, Jacobs D E. 2009. *Exposure of U.S. children to residential dust lead, 1999-2004: I. Housing and demographic factors*. 117(4): Environ Health Perspect. 468-474.

Galke W, Clark S, Wilson J, Jacobs D, Succop P, Dixon S, Bornschein B, McLaine P, Chen M, 2001. *Evaluation of the HUD lead hazard control grant program: Early overall findings*. Environ. Research. 86, 149-156.

Guo Y, Kannan K. 2011 *Comparative Assessment of Human Exposure to Phthalate Esters from House Dust in China and the United States*. Environ Sci Technol. 2011 Mar 24.

Hoh E, Hunt RN, Quintana PJ, Zakarian JM, Chatfield DA, Wittry BC, Rodriguez E, **Matt GE**. 2012. *Environmental tobacco smoke as a source of polycyclic aromatic hydrocarbons in settled household dust*. Environ Sci Technol. 46(7):4174-83.

Imm P, Knobeloch L, Buelow C, Anderson HA. 2009. *Household exposures to polybrominated*

*diphenyl ethers (PBDEs) in a Wisconsin Cohort.* Environ Health Perspect. 117(12):1890-5.

Jacobs DE, Clickner RP, Zhou JY, Viet SM, Marker DA, Rogers JW, Zeldin DC, Broene P, Friedman W. 2002. *Prevalence of Lead-Based Paint in U.S. Housing.* Environmental Health Perspectives. 110(10): A599-A606.

Kercsmar, CM, Dearborn DG, Schluchter M, Xue L, Kirchner HL, Sobolewski J, Greenberg SJ, Vesper SJ, Allan T. 2006. *Reduction in asthma morbidity in children as a result of home remediation aimed at moisture sources.* Environ Health Perspect. Oct;114(10):1574-80.

King BA, Travers MJ, Cummings KM, Mahoney MC, Hyland AJ. 2010. *Secondhand smoke transfer in multiunit housing.* Nicotine Tob Res. 12(11):1133-41.

Kraev TA, Adamkiewicz G, Hammond SK, Spengler JD. 2009. *Indoor concentrations of nicotine in low-income, multi-unit housing: associations with smoking behaviours and housing characteristics.* Tob Control. 18(6):438-44.

Krieger J, Jacobs DE, Ashley PJ, Baeder A, Chew GL, Dearborn D, Hynes HP, Miller JD, Morley R, Rabito F, Zeldin DC. 2010. *Housing interventions and control of asthma-related indoor biologic agents: a review of the evidence.* J Public Health Manag Pract. 16(5 Suppl):S11-20. Review

Krieger, JW, Takaro TK, Song L, and Weaver M. 2005. *The Seattle-King County Healthy Homes Project: A randomized, controlled trial of a community health worker intervention to decrease exposure to indoor asthma triggers.* Amer. J. Pub. Health, 95(4): 652-659.

Lai MW, Klein-Schwartz W, Rodgers GC, Abrams JY, Haber DA, Bronstein AC, Wruk KM. 2006. *2005 Annual Report of the American Association of Poison Control Centers' National Poisoning and Exposure Database.* Clinical Toxicology, 44: 803-932.

Lanphear, BP, Dietrich, K, Auinger, P, Cox C. 2000. *Cognitive deficits associated with blood lead concentration <10 g/dL in U.S. children and adolescents.* Public Health Reports. 115(6): 530-1.

Logue JM, McKone TE, Sherman MH, Singer BC. 2011. *Hazard assessment of chemical air contaminants measured in residences.* Indoor Air. 21(2):92-109

Logue JM, Price PN, Sherman MH, Singer BC. 2012. *A method to estimate the chronic health impact of air pollutants in U.S. residences.* Environ Health Perspect. 120(2):216-22

MacDonald C, Sternberg A, Hunter PR. 2007. *A systematic review and meta analysis of interventions aimed at reducing exposure to house dust on the development and severity of asthma.* Environ Health Perspect 115:1691-1695.

- Matt GE, Quintana PJ, Zakarian JM, Fortmann AL, Chatfield DA, Hoh E, Uribe AM, Hovell MF. 2010. *When smokers move out and non-smokers move in: residential thirdhand smoke pollution and exposure*. *Tob Control*. 20(1):e1.
- Matt GE, Quintana PJ, Destailats H, Gundel LA, Sleiman M, Singer BC, Jacob P, Benowitz N, Winickoff JP, Rehan V, Talbot P, Schick S, Samet J, Wang Y, Hang B, Martins-Green M, Pankow JF, Hovell MF. 2011. *Thirdhand tobacco smoke: emerging evidence and arguments for a multidisciplinary research agenda*. *Environ Health Perspect*. 119(9):1218-26.
- Meng QY, Turpin BJ, Korn L, Weisel CP, Morandi M, Colome S, Zhang JJ, Stock T, Spektor D, Winer A, Zhang L, Lee JH, Giovanetti R, Cui W, Kwon J, Alimokhtari S, Shendell D, Jones J, Farrar C, Maberti S. 2005. *Influence of ambient (outdoor) sources on residential indoor and personal PM2.5 concentrations: analyses of RIOPA data*. *J Expo Anal Environ Epidemiol*. 15(1):17-28.
- Mielke HW, Powell ET, Gonzales CR, Mielke PW Jr, Ottesen RT, Langedal M, 2006. *New Orleans soil lead (Pb) cleanup using Mississippi River alluvium: need, feasibility, and cost*. *Environ Sci. Technol.*, 40(8): 2784- 9.
- Mielke, HW, Powell ET, Gonzales CR, Mielke PW. 2007. *Potential lead on play surfaces: Evaluation of the "PLOPS" sampler as a new tool for primary lead prevention*. *Environ. Res*. 103(2): 154-9.
- Morgan WJ, Crain EF, Gruchalla RS, O'Connor GT, Kattan M, Evans R 3rd, Stout J, Malindzak G, Smartt E, Plaut M, Walter M, Vaughn B, Mitchell H; Inner-City Asthma Study Group. 2004. *Results of home-based environmental intervention among urban children with asthma*. *N Engl J Med*. 351: 1068-80.
- Nagaraja, J, Menkedick J, Phelan KJ, Ashley P, Zhang X, Lanphear BP. 2005. *Deaths from residential injuries in US children and adolescents, 1985-1997*. *Pediatrics*. 116(2): 454- 461.
- Northridge J, Ramirez OF, Stingone JA and Claudio L. 2011. *The Role of Housing Type and Housing Quality in Urban Children with Asthma*. *J Urban Health*. 2011 Mar;87(2):211-24.
- Reponen T, Vesper S, Levin L, et al. 2011. *High environmental relative moldiness index during infancy as a predictor of asthma at 7 years of age*. *Ann Allergy Asthma Immunol*. 107(2): 120.
- Reponen T, Lockey J, Bernstein J, et al. 2012. *Infant origins of childhood asthma associated with specific molds*. *J Allergy Clin Immunol*. In Press.
- Sandel M, Baeder A, Bradman A, Hughes J, Mitchell C, Shaughnessy R, Takaro TK, Jacobs DE. 2010. *Housing interventions and control of health-related chemical agents: a review of the evidence*. *J Public Health Manag Pract*. Sep-Oct;16(5 Suppl):S24-33. Review.

Selgrade MK, Lemanske RF Jr, Gilmour MI, Neas LM, Ward MD, Henneberger PK, Weissman DN, Hoppin JA, Dietert RR, Sly PD, Geller AM, Enright PL, Backus GS, Bromberg PA, Germolec DR, Yeatts KB. 2006. *Induction of asthma and the environment: what we know and need to know*. Environ Health Perspect. 114(4):615-9.

Sternthal MJ, Jun HJ, Earls F, Wright RJ. 2010. Community Violence and Urban Childhood Asthma: A Multilevel Analysis. European Respiratory Journal. 36(6): 1400-9.

Takaro TK, Krieger JW, Song L. 2004. *Effect of environmental interventions to reduce exposure to asthma triggers in homes of low-income children in Seattle*. Journal of Exposure Analysis and Environmental Epidemiology, 14, S133-S143.

Takaro TK, Krieger J, Song L., Sharify D, Beaudet J. *The breath-easy home: the impact of asthma-friendly home construction on clinical outcomes and trigger exposure*. Amer J Public Health. 2011; 101: 55-62.

Van Deusen A, Hyland A, Travers MJ, Wang C, Higbee C, King BA, Alford T, Cummings KM. 2009. *Secondhand smoke and particulate matter exposure in the home*. Nicotine Tob Res. 11(6):635-41.

Wilford, B H, Shoeib M, Harner T, Zhu J, Jones KC. 2005. *Polybrominated diphenyl ethers in indoor dust in Ottawa, Canada: implications for sources and exposure*. Environ Sci Technol. 39. 7027-7035.

Wilson J, Pivetz T, Ashley P, Jacobs D, Strauss W, Menkedick J, Dixon S, Tsai HC, Brown V, Friedman W, Galke W, Clark S. 2006. *Evaluation of HUD-funded lead hazard control treatments at 6 years post-intervention*. Environ Res. 102(2): 237-48.

Wilson KM, Klein JD, Blumkin AK, Gottlieb M, Winickoff JP. 2011. *Tobacco-smoke exposure in children who live in multiunit housing*. Pediatrics. 127(1):85-92.

Wilson SE, Kahn RS, Khoury J, Lanphear BP. 2007. *The role of air nicotine in explaining racial differences in cotinine among tobacco-exposed children*. Chest. 131(3):856-62.

Wright R. 2006. Health Effects of Socially Toxic Neighborhoods: The Violence and Urban Asthma Paradigm. Clinics in Chest Medicine. 27. 413-21.

Zota AR, Rudel RA, Morello-Frosch RA, Brody JG. *Elevated house dust and serum concentrations of PBDEs in California: unintended consequences of furniture flammability standards?* Environ Sci Technol. 42(21):8158-64.