Facsimile Transmittal

1287682175 - 9054

U. S. Department of Housing and Urban Development
Office of Department Grants Management and Oversight

OMB Approval No. 2525-0118
exp. Date (5/30/2008)

*** Name of Document Transmitting:** Nothing Faxed with this Application

1. Applicant Information:

* Legal Name: University of Cincinnati

* Address:

* Street1: 51 Goodman Drive, University Hall Suite 530

Street2: P.O. Box 210222

* City: Cincinnati

County: Hamilton

* State: OH: Ohio

* Zip Code: 45221-0222 * Country: USA: UNITED STATES

2. Catalog of Federal Domestic Assistance Number:

* Organizational DUNS: 0410647670000 CFDA No.: 14.906

Title: Healthy Homes Technical Studies Grants

Program Component:

3. Facsimile Contact Information:

Department: Environmental Health

Division: College of Medicine

4. Name and telephone number of person to be contacted on matters involving this facsimile.

Prefix: Dr. * First Name: Tiina

Middle Name:

* Last Name: Reponen

Suffix:

* Phone Number: 513-558-0571

Fax Number: 513-558-2263

*** 5. Email:** tiina.reponen@uc.edu

*** 6. What is your Transmittal? (Check one box per fax)**

☐ a. Certification ☐ b. Document ☐ c. Match/Leverage Letter ☒ d. Other

*** 7. How many pages (including cover) are being faxed?** 1

Form **HUD-96011** (10/12/2004)

Budget Justification

Personnel at the University of Cincinnati

[redacted] (PI) 1.2 calendar months will be responsible for overall performance and management of the study with 10% (Years 1-2) of her salary support from this project. She will in charge of interaction and coordination between all co-investigators, preparation of manuscripts and progress reports to HUD.

[redacted] (co-investigator) 0.6 calendar months will actively participate in the study design issues with a specific focus on the interpretation of data related to traffic-related air pollution. He will be funded at 5% (Years 1-2) of his salary from this project.

[redacted]n (co-investigator) 1.2 calendar months is budgeted at 10% effort for Years 1-3. She will oversee all the statistical analyses of the data.

[redacted] (co-investigator) 2.4 calendar months is budgeted at 20% effort for Year 1-2. [redacted] will conduct the modeling to determine child-specific average and cumulative exposure to TRAP from birth through age seven. He will also contribute to the epidemiological aspects of the study design and data analysis.

[redacted] (Research Assistant) 2.4 calendar months is budgeted at 20% effort for Year 1. She will analyze the archived samples for endotoxin and (1-3)-β-D-glucan.

[redacted] (Research Associate) 3.36 calendar months is budgeted at 28% effort for Year 1-2. She will do the statistical data analysis.

Co-investigator participating at no cost to HUD:

[redacted] will oversee the analysis of archived dust samples for 36 mold species by the PCR and the calculation of ERMI and will participate in the interpretation of aeroallergen data.

Fringe Benefits:

Fringe Benefits are a direct charge as a percentage of salaries and wages at rates established by the University of Cincinnati and reviewed annually by DHHS.

Supplies and Materials:

This category includes supplies and analysis kits for the analysis of 140 samples for endotoxin and (1-3)-β-D-glucan in Year 1 (total $4,480):
5 Glucatell kits @$585/each = $2,925
10 Pyrochrome kits @$88/each = $880
Other reagents for assays (Glucashield, reagent water, endotoxin standard) = $325
Tubes and pipet tips = $350

Travel:

One trip to HUD for two investigators from the University of Cincinnati team is budgeted for each year (flight: 2 x $650; hotel 2 x $150; per diem 2 x $142; local travel $38 = $1,922/year).
One trip to national professional conference is also budgeted for each year (flight: $800; hotel $910; registration $600; local travel $52 = $2,362/year).
Year-2 has incorporated a 3% increase for inflation.

IT IS RECOMMENDED THAT YOU PRINT THESE INSTRUCTIONS BEFORE CONTINUING. DO NOT MODIFY THE ELOGIC MODEL® TEMPLATE. DO NOT CUT AND PASTE INTO THE ELOGIC MODEL® TEMPLATE.
When opening the eLogic Model®, you will be asked if you want to enable "Macros"; click Yes. The eLogic Model® uses a Microsoft Excel®

platform. **"**Macros" are a form of programming used in Excel® to enable additional functionality. You will need to "enable" the "Macros" to use all functions on your eLogic Model®. To enable the macros to function, you will have to adjust the security settings on your computer.

Testing to See If the Macros are Working.

If you do not see this dialog box when you first open your eLogic Model®, then check to see if the Macros are working by opening the eLogic Model®, and going to the Tab labeled Year 1. Click on the gray area of the column labeled, "Needs." If the column expands, your Macro settings are working. To expand and return the cell to its original size, click once. Do not double click.

Depending on your version of Excel®, there are several steps you must take in order to use all the functions in your eLogic Model®. The description below provides information for the four most common versions of Excel® in use today, one of which is probably installed on your computer. If you are working in a network, and you cannot control your desktop settings, contact your system administrator for support.

SECURITY AND THE USE OF MACROS
You will need to "enable" the Macros to use all functions on your eLogic Model®. After creating and saving your your eLogic Model®, you may reset your security levels to their original settings.

Excel® 2007 - You can change macro security settings in the Trust Center, unless a system administrator in your organization has prevented you from changing the settings.

On the Developer tab, in the Code group:

- Click Macro Security.

Tip: If the Developer tab is not displayed, click the Microsoft Office Button (top left of your Excel®), click Excel® Options, and then in the Popular category under Top options for working with Excel®, click Show Developer tab in the Ribbon.
In the Macro Settings category, under Macro Settings, click the option that you want. **Note:** Any changes that you make in the Macro Settings category in Excel® apply only to Excel® and do not affect any other Microsoft Office program.

Tip: You can also access the Trust Center in the Excel® Options dialog box.

- Click the Microsoft Office Button, and then click Excel® Options in the Trust Center category.

- Click Trust Center Settings, and then click the Macro Settings category.

- If your settings are set to "Disable all macros with notification", when you open your Excel®, you will see a Security Warning stating "Macros have been disabled" and Options button to the left (this button is located under the toolbars).

If you do not change the Macro security settings, you will have to enable the Macros each time you open the Excel®.

Excel® 2003 - There are four levels of security regarding the use of Macros: Very High, High, Medium, and Low. If upon opening the eLogic Model® the dialog box states that you must change your Security setting to enable Macros, your security settings are either set to Very High or High and you must take the following steps:

- Go to the toolbar at the top of the screen and click on "Tools."

- Then click "Options" and then click the tab labeled "Security" located on the top right of the window.

- At the bottom right of the window, click the button that says "Macro Security" and select Medium as your setting.

- Click "OK" and then click "OK" in the Options window.

- Close your eLogic Model®. Re-open your eLogic Model®. You will now receive a dialog box with the message "Security Warning."

- Click on the button at the bottom that says "Enable Macros." Your eLogic Model® will open and be fully functional.

If upon opening the eLogic Model® the dialog box gives you an option to enable "Macros" at that moment, it means that Security is set to Medium. All you need to do is to click the button at the bottom of the dialog box that says, "Enable Macros." Your eLogic Model® will open and be fully functional.

If upon opening the eLogic Model® there is no dialog box, your Security setting is set on "Low" and your Macros are already enabled. No additional step is needed.

Excel® 2000 - There are three levels of security regarding the use of Macros: High, Medium, and Low. The High security setting automatically disables most Macros and does not alert you to the action. If when entering Services/Activities in Column 3, or Outcomes in Column 5, you select "other", the word "other" appears and remains in the cell, the Macro is not functioning. Save and close changes you have made thus far.

- From the menu, select "Tools," "Macro", "Security". A dialog box will open.

- Click on the "Security" TAB and select "Medium,"

- Click "OK." Reopen your eLogic Model®. A dialog box will open. Select "Enable Macros." Your eLogic Model® will open and be fully functional.

If your copy of Excel® is already set to "Medium" security, the enable Macros dialog box will appear and you can proceed as above.

The low security setting automatically enables all Macros and you will not receive any message. The eLogic Model® will open and be fully functional.

Excel® 1997 - If you are using this version of Excel® and need assistance, please contact HUD's NOFA Information Center for assistance at (800) HUD-8929 week days during their operating hours of 10:00 a.m. to 6:30 p.m. eastern time, Monday to Friday, except federal holidays. The NOFA Information Center cannot provide you additional help right before a deadline date. Please take into account their operating hours and allow at least 72 hours for the NOFA Information Center to be able to get you additional help.

Additional Support
If after trying the instructions for your version of Excel® and need additional assistance, please contact the NOFA Information Center at (800) HUD-8929.

Persons with hearing or speech impairments may access this number via TTY by calling the Federal Information Relay Service at (800) 877-8339. The NOFA Information Center is open between the hours of 10 a.m. and 6:30 p.m. eastern Ttme, Monday through Friday, except federal holidays.

Check that You Have the Correct eLogic Model® for your Program.
The eLogic Model® is found in the Instructions Download for the application package posted to the Grants.gov website. Before you begin completing your eLogic Model®, check the name of the program and the fiscal year that is populated on the eLogic Model®. If it contains a program name different from the program application, or does not have 2010 in the Fiscal Year data field, you have opened the wrong eLogic Model®. To correct, go back to the website and look for the program you want to apply for and download the proper eLogic Model®. **New**

Features in the 2010 eLogic Model®
The 2010 eLogic Model® has new features and functions compared to the 2009 eLogic Model that are described below:

Coversheet

A **Coversheet** Tab has been added to collect additional data regarding the applicant and place of performance. This additional data allows **HUD** to better match the **eLogic Model®** that is submitted with the application and with the eLogic Model® that has been negotiated, and reports that are submitted as As required over theperformance period fo the award. The **Coversheet** now provides for a Logic Model Amendment Number. Program **eLogic Models®** are initially created for a three year period since it is difficult to project outputs and outcomes going beyond three years. The use of a Logic Model Amendment Number allows **HUD** to issue an amended **eLogic Model®** for programs longer than three years duration.

This Logic Model Amendment Number field will also allow HUD to review and approve amendments to the eLogic Models® where **due to circumstances in the community**, the original projects need to be modified. The modifications are not to be granted simply because an agency is not meeting its proposed goals, but rather to take into account extraordinary circumstances in a community that requires **HUD** to consider an amendment to the original **eLogic Model®** to accommodate changing needs. The amendment will also allow **HUD** to amend the eLogic Model to cover an additional one year where a 12 month extension has been granted on an award.

CCR Doing Business As (DBA) Field
When entering the applicant organization profile in the **Central Contractor Registration (CCR)**, organizations may have a **legal name** and a

"Doing Business As" (DBA) Name. Sometimes the **Legal Name** in the CCR represents that part of a large organization which is responsible for paying the federal taxes for all divisions or organizations within its structure. This may be the case with large universities or state or local governments. This may happen because the Doing Business As Name can be used to distinguish sub-organizations of the entity at different locations, e.g. Departments of a State or local government or university campuses. To ensure that we accurately reflect the organization or sub-organization of the legal entity that will be receiving the **HUD** funds, a field has been added to capture the CCR Doing Business As Name and **DUNS** Number.

Mandatory Fields
There are seven**"mandatory**" fields in your eLogic Model®**: "Applicant Legal Name", "DUNS Number", and "Project Name", "Grantee Contact Name", "Grantee Contact email", "Logic Model Contact Name", "Logic Model Contact email".** You must enter the required data in these fields as they are recorded in the CCR for the **eLogic Model®** to be complete. Before closing and saving your **eLogic Model®,** click the button at the top left of the worksheet (Tab Coversheet) that says **"Check Errors".** If you did not complete any of the **"mandatory"** fields, a message box will appear telling you what field(s) was not completed and the field will be highlighted in yellow. If you attempt to close your **eLogic Model®** without completing the **"Applicant Legal Name"** and/or the **DUNS** Number, you will receive a dialog box that reminds you that the required data has not been entered. Click **"OK"** and the cursor will go to the required field and allow you to enter the required data. The final dialog box will ask you if you want to save your data. If you want to save the data, click "**Yes"** as you would do with any Microsoft Excel® workbook. **If you click "No", the file will close and your data will not be saved.** Please remember when saving your **eLogic Model®** that **file names** must not contain any special characters or spaces which could be **"read"** as viruses File names must be no more than fifty characters including any path information in the file name. See the **FY2010 General Section** for complete details.

The eLogic Model® Workbook
The eLogic Model® workbook has 12 separate worksheets and each worksheet is identified by a Tab at the bottom of the page. If you cannot see all the Tabs, be sure to maximize your workbook by clicking the middle button in the top right corner of the workbook to expand your window or move your bottom scroll bar so all the Tabs appear.
The 12 Worksheets/Tabs are:
- Instructions
- Coversheet
- Year1
- Year2
- Year3
- Total
- GoalsPriorities
- Needs
- Services
- Outcomes
- Tools
- Reporting

Instructions for Completing the Cover Sheet
NOTE: The "**Fiscal Year**" does not appear on the Cover Sheet but in the Tabs for each year of the project, See description under,

"**INSTRUCTIONS FOR COMPLETING THE Year 1, Year 2 Year 3 and Total Tabs in the eLogic Model®."**

Program Information
"HUD Program Name" and "**Program CFDA #"** located on Rows 11 and 12 respectively are pre-populated.

"Program Component" is located on Row 13 to 19. If the program under which you are applying has components, e.g., **EOI** or **PEI** under the **Fair Housing Initiatives Program** click on the component field. A drop down menu will appear. Select as many component that you are applying under. If you are permitted by the **NOFA** to apply for funding under more than one program component, using the drop down select as many as needed in the fields provided. If there are no components in the funding opportunity for which you are seeking funding, skip this field. Once you have entered your **"Program Component"** in the **"Cover Sheet",** worksheets **Year1**, **Year2**, **Year3**, and **Total** will automatically populate the same information.

Grantee Information

"**Applicant Legal Name**" is located on Row 21 and is a **mandatory field**. Enter the **legal name**as entered in the Central Contractor Registration and which matches the applicant **Legal Name** entered in **Box 8a** in the **SF-424** in your application. Once you have entered your **"Applicant Legal Name"** in the **"Coversheet"**, **worksheets**, **Year1**, **Year2**, **Year3**, and **Total worksheets** will automatically populate the same information.

"**CCR Doing Business As Name**" is located on Row 22, is new for 2010. . Only complete this field if your **Central Contractor Registration** includes an entry in **Doing Business As (DBA).** Enter the name as it appears in CCR. Once you have entered **your "CCR Doing Business As Name"** in the **"Cover Sheet"**, worksheets, **Year1**, **Year2**, **Year3**, and **Total** worksheets will automatically populate the same information.

"**DUNS Number**" is located on Row 23 and is a **mandatory field**. Enter the **DUNS #** exactly as it appears in **box 8c** of the **SF-424** and as registered with the **Central Contractor Registration**. The **DUNS** number entered must be for the organization that is entered in **box 8a** of the **SF-424**, Application for **Federal Assistance**. Your **DUNS** number is a nine digit number or a nine digit plus four digit number. Some applicants will use a nine digit plus four digit **DUNS** number. If you do, then insert the four digits in the field provided. If you do not use a **DUNS** plus four #, leave the four digit field blank. Make sure you enter the **DUNS** number accurately. Once you have entered your "**DUNS** Number" in the
"Cover Sheet", worksheets **Year1**, **Year2**, **Year3**, and **Total** worksheets will automatically populate the same information

"**City**" is located on Row 24. Enter the City where your organization is located. This information must match the applicant address data in your application SF424. .

"**State**" is located on Row 25 Use the dropdown to enter the State where your organization is located, this information must match the **SF-424** data in your application.

"**Zip Code**" is located on Row 26. Enter the same nine-digit zip code used for the applicant address in your SF424.

"**Grantee Contact Name**" and "**Grantee Contact email**" are located on Rows 27 and 28 respectively. Enter the Grantee Contact Name and email address in the fields provided.

"**Logic Model Contact Name**" and "**Logic Model Contact email**" are located on Rows 28 and 29 respectively. Enter the name of the person that completed the **eLogic Model®** and their **email address** in the field provided or the name and email of a person to contact who can address questions concerning the eLogic Model submitted with the application and, if you are selected for an award, **eLogic Model reporting®.**

Project Information
"**Project Name**" is located on Row 32 and is a **mandatory field**. Enter the name of your project in the field provided. Use exactly the same name as you did on box 15 of the form SF424. If you did not provide a project name on the **SF424**, please make sure that you provide a project name in your **eLogic Model®.** The project name is helpful in distinguishing logic models submitting by the same grantee over multiple years and for differing projects.

If you are submitting multiple funding requests for the 2010 fiscal year funding under the same applicant name for the same **HUD** program, you **must** include a **project name** that can distinguish between the two applications and logic models submitted. The **project name** may be based upon the location of the project, the address at which it is located, anything that would distinguish one project from another for the same applicant. If you are not sure what to name your project, using your applicant name or acronym and then adding a 1 or 2, or 3 , etc., to distinguish the projects would be sufficient to distinguish the two logic models being processed.

Once you have entered your **"Project Name" in** the **"Cover Sheet"**, worksheets", **Year1**, **Year2**, **Year3**, and **Total worksheets** will automatically populate the same information.

"**Project Location City/County/Parish"** is located on Row 33. Applicants, except Indian Tribes, will enter the city or township or County/Parish where the project will be located. If there are multiple locations, enter the location where the majority of the work will be done. Indian Tribes, including multi-state tribes, should enter the city or county associated with their business address location.

"**Project Location State**" is located on Row 34. Use the dropdown menu to select the location of your project. The data field label, **"Project Location State"** includes all fifty states and American Samoa, District of Columbia, Federated States of Micronesia, Guam, Marshall Islands, Northern Mariana Islands, Palau, Puerto Rico, and the Virgin Islands. In the case of multi-state or regional entities, enter the State location where the majority of activities are to occur. For Indian Tribes, enter the state applicable to the business address of the Tribal entity.

"**Zip Code**" is located on Row 35 and is to be entered for the "Project Location State". Please enter the nine digit zip code.
"**Project Type" is located on Row 36**." Project Type describes the type of project you are doing, Please see the program **NOFA** for specific instructions. If no instructions are provided, provide a project type that would categorize the nature of the program e.g. housing counseling; family self-sufficiency program; research; regional development, community development, fair housing; technical assistance; etc."**Construction Type"** is located on Row 37 and describes the type of Construction you are doing, e.g., new construction, rehabilitation, acquisition, mixed use development, etc. A logic model may provide specific drop down selections for this field based upon program **NOFA** If you are not involved with a construction program, leave the field blank.

Additional Information- Leave Blank At the Time of Application

"**Grants.gov Application Number**", "**HUD Award Number**", and "**Logic Model Amendment Number**" are located on Rows 39, 40 and 41 respectively. THESE ARE FIELDS THAT ARE TO BE COMPLETED ONLY IF YOU ARE SELECTED AS A GRANTEE AND ARE SUBMITTING YOUR REPORTS TOHUD.

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NSTRUCTIONS FOR COMPLETING THE Year 1, Year 2 Year 3 and Total Tabs in the eLogic Model®

The "**Fiscal Year**" represents the fiscal year of the Notice of Funding Availability **(NOFA)** under which the award will be made. This field is pre-populated and located in **Tabs Year1**, **Year2**, **Year3**, and **Total** in cell [O6] below the **HUD** logo.
The **"Year1"** Tab is the first sheet of the **eLogic Model**® workbook to be used to enter your data for columns labeled:

- **HUD Goals**
- **Policy Priority**
- **Needs**
- **Services/Activities**
- **Measures**
- **Outcomes**
- **Measures**
- **Evaluation Tools**

If you have a multi-year award, you will enter data in the **Year2**, **Year3**, and **Total** worksheets. These worksheets are identical in format as Year1. Applicants applying for a multiple year award must complete a worksheet for each year of performance showing what is to be accomplished per year. The **"Total"** worksheet should be used to show the *sum of cumulative* accomplishments achieved for all Services/Activities and Outcomes for all years covered by the award. For example, a two-year award would include worksheets showing Services/Activities and Outcomes covering **Year1**. The **Year2** worksheet would show Services/Activities covering **Year2.** The **"Total"** worksheet would show the *cumulative* totals for all Services/Activities and Outcomes for both **Year1** and **Year2**. A three-year award would include the worksheets showing all Services/Activities and Outcomes for **Year1**, **Year2**, **Year3**, and the **"Total"** worksheet would show the *cumulative* totals for all **Services/Activities** and **Outcomes** for **Year1**, **Year2**, and **Year3**.

A one-year award would include ONLY Year1. A Total Worksheet is not required for a one year award
Note: Some cells of the worksheet are "lock protected" so you can only make entries in cells that are for input as directed by these instructions.

"**Reporting Period**", "**Reporting Start Date**" and "**Reporting End Date**" are fields located in **Year1**, **Year2**, **Year3**, and **Total** worksheets. The **Reporting Dates remain blank at the time of application** and are completed when submitting a report to HUD. See "INSTRUCTIONS FOR REPORTING PERFORMANCE TO HUD" later in these Instructions.

COLUMNS OF THE eLogic Model® (1-7)
Column 1 – Policy
Under the "Policy" Column (1), there are actually two columns; one labeled HUD Goals, and the other labeled Policy Priority. Review the HUD Goals and Policy Priorities by clicking on the Tab labeled, "Goals Priorities" at the bottom of the **eLogic Model®.** For each of the **eLogic Model®** worksheets used in your application, select the HUD Goals and Policy Priorities that your program will address. You do this by clicking the mouse in one of the cells in Column (1) of the worksheets labeled **(Year1, Year2, Year3, Total)**. A little dropdown arrow appears. Click the dropdown arrow and a dropdown list of letters and numbers that correspond to the HUD Goals and Policy Priorities will appear. Select one or more of the HUD Goals and Policy Priorities number/letter in the list by clicking it. If you make an error and want to remove the listing, select the cell and click the DELETE KEY on your keyboard. The item will be deleted.

To associate the HUD Goals and Policy Priorities to particular Services/Activities, select a HUD Goal and Policy Priority in Column 1 and then select related Services/Activities in Column 3, Programming. Please remember that not every Activity and Outcome is related to a HUD Policy Priority so that you can select a HUD goal without selecting a HUD policy priority. Also your activities and outcomes may be associated to more than one HUD goal and one policy priority.

If there is more than one Service/Activity to be administered related to the HUD Goal and Policy Priority, select all the related Services/Activities and associated Outcomes and skip as many rows as needed to identify the activities and outcomes associated to the HUD Strategic Goal and/or Policy Priority. Then before entering the next HUD Goal and Policy Priority, skip a row and then enter the next Strategic Goal and/or HUD Policy Priority and all the associated activities and outcomes to ensure that the association is clear.

Applicants/Grantees can make clear during each Year of their award, what Services/Activities are related to the achievement of the HUD Goal and Policy Priority selected.

Repeat this process until you have selected all HUD Goals and Policy Priorities that apply to your application.

Column 2 – Planning
Under the "Planning" Column (3), select a "Needs" statement. Do this by clicking the mouse in one of the cells of this column. A little dropdown arrow appears. Click the dropdown arrow and a dropdown list of "Needs" statement(s) will appear. Select one or more of these Needs statements in the list by clicking it. Because the column may be too narrow to show the full Needs statement in the dropdown list, you may wish to refer to the Tab labeled "Needs" to see the full statements or you can (using your mouse) click on the shaded cell [D7] labeled "Needs" and this will expand the cell. To return the cell to its original size, click again on cell [D7] labeled "Needs."

When expanding and returning the cell to its original size, click once. Do not double click. When you select a "Needs" statement, the full statement will fill the cell. If you don't want this statement, you can simply click the dropdown arrow again and select another item; or, you can delete a statement by selecting the cell and clicking the **DELETE KEY** on your keyboard. If you want to select more than one statement, go to the next cell in the column and repeat the process selecting the appropriate statement(s). You can do this until you have selected all the statements that are appropriate to your proposed program.

The selections should reflect the Needs identified in your response to your Rating Factor narratives. There is no need to select all the Needs statements if they do not apply to what you plan to address or accomplish with the funding requested. When developing your eLogic Model®, associate the Needs statement(s) selected to the Services/Activities and Outcome(s) you select. To show relationships, you can skip rows when making your Needs statement(s) selection(s) and remember to place the associated Services/Activities and Outcome(s) in the same row.

Column 3 – Programming
Under the "Programming" Column (3), select Services/Activities. You do this by clicking the mouse in one of the cells of this column. A little dropdown arrow appears. Click the dropdown arrow and a dropdown list of eligible Services/Activities appears. Select one of the Services/Activities in the list by clicking it. Identify your Year1 Services/Activities using the Year1 worksheet. Identify Year2 Services/Activities using the Year2 worksheet. Identify Year3 Services/Activities using the Year3 worksheet. Make a composite eLogic Model® of all years on the Total worksheet. *If you are only applying for a one year award, you do not need to create a composite eLogic Model® on the Total Tab.* Because the column may be too narrow to show the full Services/Activities statement in the dropdown list, you may wish to refer to the Tab labeled "Services" to see the full range of eligible Services/Activities, or you can (using your mouse) click on the shaded cell [E7] Services/Activities. This will expand the cell. To return the cell to its original size, click on shaded cell [E7] Services/Activities. When expanding and returning the cell to its original size, click once. **Do not double click.**

NOTE: If the Services/Activities that you are looking for does not appear on the dropdown list, choose "other" from the dropdown list and follow the instructions in the dialog boxes which are also described below:

- A dialog box will appear that says **"Year1".** Click **"OK"** and another dialog box will appear that says, "You have selected 'other' and have the option to create a new Service/Activity or Outcome and a Unit of Measure. Are you prepared to do this now?"

- Click **"Yes"** if you wish to continue.

- You will see an input window that says, "Enter a new Activity/Service or Outcome to your dropdown list." Enter your new Service/Activity in the field provided and click **"OK."**

- A second window will appear that says, "Specify a Unit of Measure." Enter the Unit of Measure in the field provided and click **"OK".** The new Service/Activity will appear in the **eLogic Model®** cell and it will be added to the dropdown list.

- The new Service/Activity which you added will be displayed with the prefix "new".

If this function does not occur when working with your **eLogic Model®** please look at the directions for enabling macros. If after following the directions and this function still does not work, please call the NOFA Information Center at 800-HUD-8929 week days during operating hours of 10:00 a.m. to 6:30 p.m. eastern time, Monday to Friday, except federal holidays. The NOFA Information Center cannot provide you additional help right before a deadline date. Please take into account their operating hours and allow at least 72 hours for the NOFA Information Center to be able to get you additional help.

YOU ARE ONLY PERMITTED TO ADD A TOTAL OF THREE NEW SERVICES/ACTIVITIES PER ELOGIC MODEL®.

- In the event that you want to delete, or change your newly created Service/Activity, follow the instructions in the dialog boxes which are also described below:

- Click the Tab labeled Services at the bottom of your screen and then click cell [B1], "Click here to allow deletion of New Activities" at the top right of the window.

- A dialog box will appear that says "Do you want to delete this new Service/Activity?", click "OK."

- A dialog box will appear that says "Caution! This will delete all instances of 'new Service/Activity in your Logic Model. Do you wish to continue?" Click "Yes."

You can only delete new Services/Activities.
To find out how to associate a Service/Activity and Outcome to a HUD Goal and Policy Priority, see the instructions under Column 1, Policy.

Column 4 – Measure
Notice that as the Services/Activities you selected appears in Column 3, a corresponding Unit of Measure appears or populates in the Column 4, Measure. The Unit of Measure could be "persons", "dollars", "square feet", "houses", "date", or some other Unit of Measure that relates to the selected Services/Activities. Immediately below the Unit of Measure are three blank cells. Enter the projected number of persons or units (or dates if applicable) you are proposing to deliver or accomplish in the "Pre" column. When entering the date, use the format M/D/YYYY. When entering your projection in the "Pre" column, type the number or date in the cell and tab down or use your mouse to go to the next cell. If you click the Enter key, you will see the error message, "Run-time error '13':".If you see this message, click the button labeled End to continue. The "Run-time error '13':" will not affect your work.

Please note that the "Post" and the Year-to-Date (YTD) columns are locked to be used later for reporting purposes so that at the time of application, you cannot enter data in these fields.

Column 5 – Impact
Under Column 5, “Impact”, select the Outcome that best corresponds to the “Needs” statement, Column 2 and Services/Activities, Column 3, which you just previously identified and selected for your eLogic Model®. This is the same procedure used for completing Column 3. When you select an Outcome from the dropdown list, a Unit of Measure automatically appears in the next column, “Measure." Since the column may be too narrow to show the full Outcome statement in the dropdown list, you may wish to refer to the Tab labeled "Outcomes” to see the full range of Outcomes, or you can (using your mouse) click on the shaded cell [J7] Outcome. This will expand the cell. To return the cell to its original size, click on shaded cell [J7] Outcome.

NOTE: When expanding and returning the cell to its original size, click once. **Do not double click**.

NOTE: If the Outcome that you are looking for does not appear on the dropdown list, choose "other" from the dropdown list and follow the instructions in the dialog boxes which are also described below:

- A dialog box will appear that says **"Year1".** Click **"OK"** and another dialog box will appear that says, "You have selected ’other’ and have the option to create a new Service/Activity or Outcome and a Unit of Measure. Are you prepared to do this now?"

- Click **"Yes"** if you wish to continue.

- You will see an input window that says, **"Enter a new Activity/Service or Outcome to your dropdown list."** Enter your new Outcome in the field provided and click "OK."

- A second window will appear that says, **"Specify a Unit of Measure.”** Enter the Unit of Measure in the field provided and click **"OK".** The new Outcome will appear in the **eLogic Model®** cell and it will be added to the dropdown list.

- The new Service/Activity which you added will be displayed with the prefix **"new".**

If this function does not occur when working with your **eLogic Model®** please look at the directions for enabling macros. If after following the directions and this function still does not work, please call the **NOFA Information Center** at 800-HUD-8929 week days during operating hours of 10:00 a.m. to 6:30 p.m. eastern time, Monday to Friday, except federal holidays. The NOFA Information Center cannot provide you additional help right before a deadline date. Please take into account their operating hours and allow at least 72 hours for the NOFA Information Center to be able to get you additional help.

YOU ARE ONLY PERMITTED TO ADD A TOTAL OF THREE NEW OUTCOMES PER ELOGIC MODEL®.
In the event that you want to delete, or change your newly created Outcome, follow the instructions in the dialog boxes which are also described below:

- Click the Tab labeled Outcomes at the bottom of your screen and then click cell [B1], "Click here to allow deletion of New Outcomes" at the top right of the window.

- A dialog box will appear that says "Do you want to delete this Outcome?", click "OK."

- A dialog box will appear that says **"Caution!** This will delete all instances of ‘new Outcome’ in your Logic Model. Do you wish to continue?" Click **"Yes."**

- **You can only delete new Outcomes.**

To find out how to associate a Service/Activity and Outcome to a HUD Goal and Policy Priority, see the instructions under Column 1, Policy.

Column 6 – Measure
As the Outcomes you selected appear in the cell, a corresponding Unit of Measure appears or populates in Column 6, Measure. The Unit of Measure could be "persons", "dollars", "square feet", "houses", "date", or some other Unit of Measure that relates to the selected Outcome. Immediately below the Unit of Measure are three blank cells. Enter the projected number of persons or units (or dates if applicable) you are proposing to deliver or accomplish in the "Pre" column. When entering the date, use the format M/D/YYYY. When entering your projection in the "Pre" column, type the number or date in the cell and tab down or use your mouse to go to the next cell. If you click the Enter key, you will see the error message, "Run-time error '13' " If you see this message, click the button labeled End to continue. The "Run-time error '13':" will not affect your work.
The "Post" and the Year-to-Date (YTD) columns are locked to be used later for reporting purposes.

Review for Using Columns 2, 3, 4, 5, and 6 of the eLogic Model®

How To Demonstrate the Relationship between a HUD Goal, Policy Priority, Services/Activities and Outcomes
In the eLogic Model®, applicants can select Services/Activities and Outcomes as appropriate to how they conduct business. There are four possible types of associations among Services/Activities and Outcomes:

One to One - A single Service/Activity can yield a single Outcome. For example, referral to an employer can yield job placement; the Service/Activity is referral and the Outcome is job placement.

One to Many - A single Service/Activity can yield more than one Outcome. For example, a Service/Activity such as referral to an employer can yield several Outcomes such as job placement, job retention lasting 30 days, and job retention lasting longer than 90 days.

Many to One - More than one Service/Activity can yield one Outcome. For example, Services/Activities such as providing resume writing, job search classes, pre-employment counseling, and referrals to employers can result in a single job placement, the Outcome.

Many to Many - More than one Service/Activity can yield more than one Outcome. For example, multiple Services/Activities such as providing resume writing, job search classes, pre-employment counseling, and referrals to employers can result in multiple Outcomes including job placement, job retention more than 30 days, job retention more than 90 days, and increased household income.
There is no predesigned way to complete your eLogic Model®. It depends on how you operate your program.

Demonstrating Relationships Between Services/Activities and Outcomes
Show the relationships between the Services/Activities and Outcomes as you create your eLogic Model® using one or more of these models described above:

- One to One
- One to Many
- Many to One
- Many to Many

Between each Service/Activity, skip a row and then start entering the next set of Services/Activities. Use the same structure to enter your associated Outcomes. There is more than enough space to do this within the eLogic Model® Template.

Repeat the process of specifying "Policy", "Needs", "Service/Activity" and "Outcome" using as many rows as is necessary to fully describe your proposal. Applicants must skip a row when selecting new HUD Goals, Policy Priorities, Needs, Activities/Services and Outcomes. The eLogic Model® form extends to six pages when printed out. You may view a preprint of your eLogic Model® at any time by selecting FILES | Print Preview from the Menu bar at the very top of the Excel® Window. It is recommended that you do this periodically to get a better view of the eLogic Model® you are creating.

Associating Services/Activities with Outcomes Over Multiple Years
You can adjust the look of your eLogic Model® by skipping rows, so that "Needs", "Services/Activities" and "Outcomes" are grouped or associated together. If you are conducting a multi-year project and the "Services/Activities" occurs in Year1 with the resulting Outcomes occurring in Year2, make sure that you show the relationship between the Services/Activities in Year1 with the Outcomes occurring in Year2 and similarly the relationships between Year2 Services/Activities with the Outcomes occurring in Year3. You can do this by leaving blank fields corresponding to the lines in which Services/Activities were identified in the previous year or years. For example, if you have enrolled someone in General Equivalency Degree (GED) classes, the results of attending the GED Classes may not result in a person obtaining a GED degree until Year 2 or Year 3.

To show the relationship over time:

- Enter the Services/Activities in Year 1 noting to yourself the line numbers on the Excel® worksheet that the Services/Activities appear in the Year 1 Tab of the eLogic Model®.

- Move to the year Tab that you are proposing the Outcomes to occur. In the Year 2 or Year 3 Tab, place the Outcomes in the Outcomes section in the same rows that you noted the Services/Activities. You will be leaving the Outcomes blank in Year 1 and the Services/Activities blank for those corresponding rows in either Year 2 or Year 3.

- Skip a row in both the Year 1 and the corresponding Year that you placed the Outcomes. Do this as many times as needed, remembering to maintain the same row numbers for Services/Activities and Outcomes across the span of years.

Demonstrating the Relationship To Needs Statements
Similarly, if you want to demonstrate the relationship between Services/Activities, Outcomes and a Needs statement, select the Needs statement and enter the Services/Activities and the corresponding Outcomes on the same row in the Excel® worksheet. To select another Needs statement, skip a row and identify the Services/Activities and Outcomes on the same row in the Excel® worksheet. This can occur within a single year or across years provided you remember to maintain the row alignment to the Needs statement, Services/Activities and Outcomes. You can continue adding activities and outcomes associated to the Needs statement as needed. When done, skip a row to move to another Needs statement and set of Services/Activities,

CAUTION, DO NOT CUT & PASTE ITEMS FROM ONE COLUMN TO ANOTHER. For example, do not cut and paste an item from the "Needs" Column to the "Services/Activities" Column, or the "Services/Activities" Column to the "Outcomes" Column. Doing so will produce an unstable worksheet which will behave erratically, requiring you to start over with a new blank eLogic Model® workbook.

Column 7 – Accountability
Under the "Accountability" Column (7), enter the tools and the process of collection and processing of data in your organization to support all project management, reporting, and responses to the Management Questions. This column provides the framework for structuring your data collection efforts. If the collection and processing of data is not well planned, the likelihood of its use to further the management of the program and support evaluation activity is limited. If data are collected inconsistently, or if data are missing, not retrievable, or mishandled, the validity of any conclusions is weakened.

The structure of Column 7 contains five components in the form of dropdown fields that address the Evaluation Process. You are responsible for addressing each of the five steps that address the process of managing the critical information about your project.

A. Tools for Measurement
B. Where Data Maintained
C. Source of Data
D. Frequency of Collection
E. Processing of Data

You may select up to five choices for each of the five processes (A-E) that supports Accountability and tracks Services/Activities and Outcomes. Given the limited space, please identify the most frequent sources for the processes (A-E). As you proceed through the remaining components, B through E, specify those components in the same order as you selected the "Tools for Measurement" listed under item A. For example, if the first Tool is "Pre-post Test," then the first item under B "Where Data Maintained" must identify where the pre-post test data is maintained, and so on through E. The first entry should pertain to "Pre-post Test." Likewise, if the second item in A is "Satisfaction Surveys," then specify the second item in B through E as it pertains to "Satisfaction Surveys."

A. Tools for Measurement. A device is needed for collecting data; e.g., a test, survey, attendance log, or inspection report, etc. The tool "holds" the evidence of the realized Services/Activities or Outcomes specified in the eLogic Model®. At times, there could be multiple tools for a given event. A choice can be made to use several tools, or rely on one that is most reliable, or most efficient but still reliable. Whatever tool is identified, it is important to remain consistent throughout the project.
Instructions: Under Column 7, Accountability, select your choices of "Tools for Measurement" to Track Services/Activities and Outcomes. You do this by clicking the mouse in one of the cells of this column. A little dropdown arrow appears. Click the dropdown arrow and a dropdown list of Tools appears. Select one or more of the Tools in the list by clicking it.

B. Where Data Maintained. A record of where the data or data tool resides must be maintained. It is not required that all tools and all data are kept in one single place. You may keep attendance logs at the main office files, but keep other tools or data such as a "case record" in the case files at the service site. It is important to designate where tools and/or data are to be maintained. For example, if your program has a sophisticated computer system and all data is entered into a custom-designed database, it is necessary to designate where the original or source documents will be maintained.

Instructions: Under Column 7, Accountability, select your choices of "Where Data Maintained." You do this by clicking the mouse in one of the cells of this column. A little dropdown arrow appears. Click the dropdown arrow and a dropdown list of Where Data Maintained appears. Select one or more of the Where Data Maintained in the list by clicking it.

C. Source of Data. This is the source where the data originates. Identify the source and make sure that it is appropriate.
Instructions: Under Column 7, Accountability, select your choices of "Source of Data." You do this by clicking the mouse in one of the cells of this column. A little dropdown arrow appears. Click the dropdown arrow and a dropdown list of Source of Data appears. Select one or more of the Source of Data in the list by clicking it.

D. Frequency of Collection. Timing matters in data collection. In most instances, you want to get it while it occurs. Collect data at the time of the encounter; if impossible, when it is most opportune immediately thereafter. For example, collect report card data immediately upon the issuance of report cards. Do not wait until after the school year is over. Collect feedback surveys at the conclusion of the event, not a few months later when clients may be difficult to reach. Reporting can be done at anytime if the data is already collected. Another important aspect of this dimension is consistency. If some post tests are collected soon after the event, but others are attempted months later, the data are confounded by the differences in the timing. If some financial data are collected at the middle of the month and others at the end of the month, the data may be confounded by systematic timing bias.
Instructions: Under Column 7, Accountability, select your choices of "Frequency of Collection." You do this by clicking the mouse in one of the cells of this column. A little dropdown arrow appears. Click the dropdown arrow and a dropdown list of Frequency of Collection appears. Select one or more of the Frequency of Collection in the list by clicking it.

E. Processing of Data. This is where you identify the mechanism that will be employed to process the data. Some possibilities are: manual tallies, computer spreadsheets, flat file database, relational database, statistical database, etc. The eLogic Model® is only a summary of the program and it cannot accommodate a full description of your management information system. There is an implicit assumption that the grantee has thought through the process to assure that the mechanism is adequate to the task(s).
Instructions: Under Column 7, Accountability, select your choices of "Processing of Data." You do this by clicking the mouse in one of the cells of this column. A little dropdown arrow appears. Click the dropdown arrow and a dropdown list of Processing of Data appears. Select one or more of the Process of Data in the list by clicking it.

Saving Your eLogic Model®
The 2010 eLogic Model® was constructed using Excel™ 2007. The models are posted on Grants.gov as Excel® 2003. You can save your eLogic Model® as an Excel® 97-2003 Workbook or as an Excel® 2007 Workbook. If you are using Excel® 97-2003 and if you see [Compatibility Mode] at the top of your Excel® where the name of the Excel® Workbook is located, it will not affect the functionality of the eLogic Model®. You can run the eLogic Model® in either Excel® version without functionality issues.
When you have completed the eLogic Model®, or wish to stop and continue later, save the file by going to the Excel® Menu bar and choosing FILE | Save As. Then specify a name for the file, and note where you save the file on your computer.

- Use the name of the HUD Program and your organization name to form a file name for your eLogic Model®. **For example, FHIP_DillardAffordableHousing.** Please note that there is an "underscore" between FHIP and no spaces between Dillard Affordable Housing separating the Program Name from the Project Name which is needed to identify the eLogic Model® in the database. This is the only convention allowed to separate these two terms. Do not use an underscore to separate words in your project name. The database will read "DillardAffordableHousing" as one name.

Do not use spaces or special characters such as dashes, periods, asterisks, and symbols when saving your eLogic Model®, only use letters and numbers. Only underscores are permitted. If you fail to follow these directions by using special characters or spaces, or the file name exceeds 50 characters, grants.gov will reject your submission as JAVA code treats your submission as containing a virus.

If your program has a program component, please follow the example below adding the Program Component "EOI" with an underscore:

- **FHIP_EOI_DillardAffordableHousing**

Please remember, if you are submitting multiple applications under the same applicant name for the same HUD program, you must distinguish between the two applications as is shown below:

- **FHIP_EOI_DillardAffordableHousing1**
- **FHIP_EOI_DillardAffordableHousing2**

Please be sure to review the file formats and naming requirements contained in the General Section.

Excel® automatically adds the file extension ".xls" or "xlsx" to your file name. Make sure the file extension is not capitalized. In following these directions, if your organizational name exceeds the 50 character limit for space, you should abbreviate your organizational name by either using its initials or a recognizable acronym, e.g., South Carolina State University maybe written as SCSU, or Howard University maybe written as HOWDU.

If you attempt to close the eLogic Model® without entering the Applicant Legal Name, the DUNS Number or Project Name, you receive a message that says "You still need to enter the Applicant Legal Name, the DUNS Number or Project Name. Dialog boxes have been created as reminders. Click OK on the dialog boxes. You will then get to the default Excel® dialog box asking if you want to save changes. Clicking CANCEL will allow you to go back and enter the missing mandatory fields. Clicking YES will save your work and close the Workbook but the mandatory fields will not be completed. **Clicking NO WILL NOT SAVE your work and will close the Workbook."**

Later, you will "Attach" this file to your application. Please remember the name of the file that you are saving. Be sure to delete any earlier version so that when you go to attach the file to your application, you select the appropriate and final file.

A single Workbook will be adequate for completing your eLogic Model®.

This ends the instructions for completing your eLogic Model® for application submission.

INSTRUCTIONS FOR REPORTING PERFORMANCE TO HUD

Do not modify or change the integrity of the eLogic Model® by adding additional Tabs or worksheets. The Instructions provided here will meet your needs. When saving your eLogic Model®, save it in the Excel® format. Do not convert it into PDF.
If your project is selected for funding, the eLogic Model® will be used as a monitoring and reporting tool upon final approval from the HUD program office. Upon approval, HUD will open the reporting side of the eLogic Model® allowing you to submit the actual Services/Activities and Outcomes against the approved (projected) Services/Activities and Outcomes. Specifically, HUD will open the "Post" and "YTD" fields in both Columns 4 and 6, and will close the "Pre" fields in the same columns. HUD will also open the Reporting Tab for you to meet the reporting requirements that are discussed below. The HUD program office will send back to you or post to a website, the approved eLogic Model® to be used for reporting purposes.

Identify the Reporting Period Covered by the Report

On the Coversheet are three fields that must be completed when you submit your reports to HUD: "**Grants.gov Application Number**", "**HUD Award Number", and "Logic Model Amendment Number**" which are located on Rows 33, 34 and 35 respectively. These fields allow HUD to associate the eLogic Model® submitted with the application with the negotiated logic model, and reports submitted. On the Year1, Year2, Year3 and Total Tabs are three additional fields labeled "Reporting Period", "Reporting Start Date" and "Reporting End Date." These three fields are not to be used at time of application. At the time of reporting they are "mandatory. They are used during the reporting process to record the Start and End date of your reporting period.
." The required data must be entered to have a complete eLogic Model® report.

Before closing and saving your eLogic Model® report, click the worksheet Tab, "Coversheet" and at the top left, click "Check Errors." If you did not complete any of the "mandatory" fields, a message box will appear telling you what field(s) were not completed and the field(s) will be highlighted in yellow. When actually reporting performance on your approved eLogic Model®, select the "Reporting Period" using the dropdown feature for:

- Yr1 1st Quarter
- Yr1 2nd Quarter
- Yr1 3rd Quarter
- Yr1 4th Quarter
- Yr2 5th Quarter
- Yr2 6th Quarter
- Yr2 7th Quarter
- Yr2 8th Quarter
- Yr3 9th Quarter
- Yr3 10th Quarter
- Yr3 11th Quarter
- Yr3 12th Quarter
- Final Report.

Note: For those reporting on a semi-annual basis, the reporting period identified in the eLogic Model® report would be Yr1 2nd Quarter, and Yr1 4th Quarter for the first year reports and Yr2 6th Quarter and Yr2 8th Quarter, etc.. For those reporting on an annual basis, the eLogic Model® reporting period would be selected as Yr1 4th Quarter. If the award was a one year award, and the award was completed, the reporting period selected would be Final Report. If the report was multi-year, for the 2nd year report, the reporting period would be Yr2 8th Quarter.

Then enter a "Reporting Start Date" and the "Reporting End Date" that reflects the reporting period you will be submitting in accordance with required reporting time frames indicated in the HUD Program NOFA and the Award Agreement. When entering the dates, you must use this format, MM/DD/YYYY including the slashes. Using the MM/DD/YYYY format will allow HUD to enter your eLogic Model® into the database. If not, you may have to resubmit your eLogic Model® if it is not accepted by HUD.

Completing Performance Information in YEAR1, YEAR2, YEAR3, and TOTAL Tabs

Your projections approved by HUD that were entered in the "Pre" Column will be locked in and the "Post" and "YTD" will be opened for reporting purposes. When reporting enter:

- Year1 accomplishments utilizing the Year1 Tab
- Year2 accomplishments utilizing the Year2 Tab
- Year3 accomplishments utilizing the Year3 Tab

For multi-year awards, use the Total Tab to capture cumulative reporting during years 2 and 3 and for your final report. *If you have a one year award you only need to complete Year1 for your final report.* If you have a two year award, use Year1, Year2, and Total. If you have a three year award, use Year1, Year2, Year3, and Total.

In each reporting period, enter your data for the reporting period cover by the report. Do not enter cumulative data in this column. The column labeled YTD is used to capture the cumulative data for the current reporting period as well as all past reports submitted covering the first year of the award. For example, if you report quarterly.

When reporting Activities in Year1:

- Enter your first quarter accomplishments in the "Post" column and the cumulative accomplishments in the "YTD" column.For the first quarter reporting, the numbers or dates will be the same in both columns.

- For the second quarter of Year1 reporting, enter the data covering second quarter activities and outcomes which occurred in that quarter only. In the "YTD" column, you will enter the cumulative total of both the first and second quarter accomplishments.

- Follow this same process for all quarters in Year1.

When reporting Activities in Year2:

- Only enter your first quarter accomplishments of Year2 in the "Post" column. The information should only reflect activities and outcomes that occur in the 1st quarter of year 2. Cumulative accomplishment from year 1 nad year 2 acitiviite nad outcones will be recorded in the Total Worksheet.

- Enter the Year 2 Quarter 1 accomplishments in the "YTD" column. For the first quarter reporting the numbers or dates will be the same for both the Actual and the YTD columns.

- For the second quarter of Year2 reporting, you will only enter the second quarter results (what actually occurred in the second quarter independent of the previous quarter) of theYear2 in the "Post" column.

- In the "YTD" column, you will enter the cumulative total of both the first and second quarter accomplishments for Year2. In the Total worksheet enter the cumulative total (the YTD from Year1 and the YTD from Year2). Follow these instructions for all quarters in Year2.

When reporting Activities in Year3, enter your first quarter accomplishments of Year3 non-cumulative in the "Post" column and the cumulative accomplishment of Year3 in the "YTD" column.

- For the first quarter reporting the numbers or dates will be the same in both columns.

- For the second quarter of Year3 reporting, you will enter the non-cumulative second quarter results (what actually occurred in the second quarter independent of the previous quarter) of the Year3 in the "Post" column.

- In the "YTD" column you will enter the cumulative total of both the first and second quarter accomplishments for Year3. In the Total worksheet enter the cumulative total (the YTD from Year1, the YTD from Year2 and the YTD from Year3). Follow these instructions for all quarters in Year3.

Using the Total Worksheet

If you have a multi-year award, you will begin to use the "Total" Tab at the beginning of the second year. The "Total" Tab is designed to show cumulative totals of Year1, Year2, and Year3. The "Total" worksheet will show the cumulative progress for Year1, Year2, and Year3. In the Total worksheet, when you are reporting accomplishments for the first quarter of Year2, add the "YTD" number from Year1 and the "YTD" number for Year2. Remember, the first quarter of Year2 and the "Post" is the same number as the "YTD" number. If you are reporting accomplishments for the second quarter of Year2, add the "YTD" number from Year1 and the "YTD" number from Year2 and add them to reach a cumulative total or

"YTD" of Year1 and the first two quarters of Year2.
Follow these instructions for all quarters in Year2, and Year3. At the end of the award period, the "Total" Worksheet will contain the cumulative total for all years.

Using the Reporting Worksheet

The Reporting Tab (worksheet) serves three functions: 1) Respond to the Management Questions, 2) Describe or explain actual performance compared to what was projected, and 3) Provide an explanation of any deviation (positive or negative) from the projections in your approved eLogic Model® .

Each program has different Management Questions that are applicable to that program only. The Management Questions contained in the eLogic Model® ask key questions related to all Services/Activities and Outcomes in the drop-down lists in the eLogic Model® forms for each HUD program. Grantees are required to report on the Management Questions which relate to the specific Services/Activities and Outcomes that are in their HUD approved eLogic Model®. These are determined during negotiations with HUD. HUD will use the approved eLogic Model® for monitoring program performance throughout the project. The Services/Activities and Outcomes identified in your approved eLogic Model®, and resultant data reported in your eLogic Model® over the award performance period should enable you to address most or all of the Management Questions reflective of your project. The data collected during the course of your work and captured in the eLogic Model® will also be useful to you in evaluating the effectiveness of your program.

Use the Reporting Tab to enter your responses to the Management Questions by entering the appropriate "Count/Amount" in the fields provided. The last question asks, "Describe the population you are serving in the space below." Enter a brief summary description of the demographic and socio-economic characteristics of the area and clients you are serving. Your description should be short and to the point -- a paragraph or less.

Narrative Description - Positive/Negative Deviation from Approved eLogic Model® Projections

In addition to your submission of your eLogic Model® results, if there are deviations from what you projected, then you must include a narrative indicating any positive or negative deviations from projected Services/Activities and Outcomes as contained in your approved eLogic Model® and explain the basis for the actual performance as compared to what was projected. In your narrative be sure to identify the Services/Activities and Outcomes from your approved eLogic Model® that you are describing and the reason why this deviation occurred. When doing this, create a paragraph header labeled, "Narrative Description - Positive/Negative Deviation from Approved Logic Model Projections." By identifying the deviations and the reasons, HUD is able to obtain information on what impacts affect the timeline for program activity and outcomes, and also will be able to share and disseminate best practices to help grantees learn from each other and to also increase the effectiveness of the program.

Saving Your Report
Save the eLogic Model® file you receive from HUD. Each time you submit your report to HUD, add the fiscal year of the NOFA in which the award was made and the reporting period to the file name. For example:
This is for a 1st quarter report.

- **FHIP_EOI_DillardAffordableHousing2010qtr1**

This is for a 2nd quarter or semi-annual report.

- **FHIP_EOI_DillardAffordableHousing2010qtr2**

This is for a 3rd quarter report.

- **FHIP_EOI_DillardAffordableHousing2010qtr3**

This is for a 4th quarter or annual report.

- **FHIP_EOI_DillardAffordableHousing2010qtr4**

This is for a 5th quarter or the first reporting period in year 2 of the project.

- **FHIP_EOI_DillardAffordableHousing2010qtr5**

Please remember, if you are reporting on multiple projects under the award for the same HUD program, you must distinguish between the two reports as is shown below. **Please note that an underscore was added before the fiscal year. Only add the underscore if there are multiple projects:**

- **FHIP_EOI_DillardAffordableHousing1_2010qtr1**
- **FHIP_EOI_DillardAffordableHousing2_2010qtr2**

For eLogic Model® Training via webcast, consult the webcast schedule found at HUD's website at: http://www.hud.gov/offices/adm/grants/fundsavail.cfm. If you have any questions regarding reporting requirements, please contact your HUD program representative.

Reporting Requirements
As part of your required reports to HUD, you must also submit an eLogic Model® report in either Excel® 2003 or 2007. (See the FY2010 General Section of the NOFA in the HUD approved electronic formats.)

2010 eLogic Model® Information Coversheet

Instructions

When completing this section there are "mandatory" fields that must be completed. These fields are highlighted in yellow. The required data must be entered correctly to complete an eLogic Model®. After completing all mandatory fields on the coversheet click on the "Check Errors" button at the top of this page. Applicant Legal Name must match box 8a in the SF-424 in your application. Enter the legal name by which you are incorporated and pay taxes. CCR Doing Business is new for 2010 eLogic Model®. Only complete this field if your registration at CCR includes an entry in Doing Business as: (dba). Enter the DUNS # as entered into box 8c of the SF-424 Application for Federal Assistance form. Enter the City where your organization is located, this information must match the SF-424 data in your application. Use the dropdown to enter the State where your organization is located, this information must match the SF-424 data in your application. This information must match the SF-424 data in your application. Enter the Grantee Contact Name and email address in the field provided. Enter the name of the person that completed the eLogic Model® and their email address in the field provided. When completing the Project Information Section, applicants except Indian Tribes must enter their Project Name, Project Location City/County/Parish, State, Project Type, and Construction Type. If there are multiple locations, enter the location where the majority of the work will be done. Indian tribes, including multi-state tribes, should enter the City or County associated with their business address location. For Indian Tribes, enter the state applicable to the business address of the Tribal entity.

Program Information

HUD Program	**Healthy Homes Technical Studies**
Program CFDA #	**14.906**
	Program Component

Grantee Information

Applicant Legal Name	University of Cincinnati
CCR Doing Business As Name	
DUNS Number	041064767 -
City	Cincinnati
State	OHIO
Zip Code	45221 - 0222
Grantee Contact Name	Mrs. Mary Ucci
Grantee Contact email	ospaward@uc.edu
Logic Model Contact Name	Dr. Tiina Reponen
Logic Model Contact email	tiina.reponen@uc.edu

Project Information

Project Name	Synergistic effect of home exposure to aeroallergens and trafic-related air pollution in the development of
Project Location City/County/Parish	
Project Location State	
Zip Code	-
Project Type	Research
Construction Type	

Additional Information for Reporting (Leave Blank At the Time of Application)

Grants.gov Application Number	
HUD Award Number	
Logic Model Amendment Number	

eLogic Model®

Year 1

OMB Approval 2535-0114 exp. 2/28/2011

Applicant Legal Name	University of Cincinnati		
CCR Doing Business As Name	0		
HUD Program	Healthy Homes Technical Studies	**Reporting Period**	
Program Component		**Reporting Start Date**	
Project Name	aeroallergens and trafic-related air pollution in the development of childrei	**Reporting End Date**	

DUNS No. 041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
3B	2c	There is a need for more efficient, effective and less costly methods to evaluate (test for, identify) and control (mitigate) lead-based paint hazards.	Housing-Housing assessments-Healthy homes |Assessments	Assessments			Research-Data analysis completed |Completed	Completed			
				88				88			**A. Tools for Measurement**
			Outreach-Outreach and education-Sessions |Sessions	Sessions			Other |Other	Other			Questionnaire
				1				1			Survey
			Research-Scientific manuscript submitted to HUD |Manuscript	Manuscript			Research-Submitted manuscript(s) for publication |Manuscript Submitted Date	Manuscript Submitted Date			
				1				1			
			Training-Staff trained |Staff trained	Staff trained			Other |Other	Other			
				2				2			**B. Where Data Maintained**
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Year 1

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DUNS No. 041064767 - 0

2010

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1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
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Applicant Legal Name	University of Cincinnati
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HUD Program	Healthy Homes Technical Studies
Program Component	
Project Name	) aeroallergens and trafic-related air pollution in the development of childre
Reporting Period	
Reporting Start Date	
Reporting End Date	
DUNS No.	041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
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Policy		Planning	Programming	**Pre**	**Post**	**YTD**	Impact	**Pre**	**Post**	**YTD**	Accountability
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eLogic Model® **Year 1** **OMB Approval 2535-0114 exp. 2/28/2011**

Applicant Legal Name University of Cincinnati

CCR Doing Business As Name 0

HUD Program Healthy Homes Technical Studies **Reporting Period**

Program Component **Reporting Start Date** **DUNS No.** 041064767 - 0

Project Name aeroallergens and trafic-related air pollution in the development of childre **Reporting End Date** **2010**

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
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Applicant Legal Name University of Cincinnati
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HUD Program Healthy Homes Technical Studies
Reporting Period
Program Component
Reporting Start Date
DUNS No. 041064767 - 0
Project Name) aeroallergens and trafic-related air pollution in the development of childre
Reporting End Date

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
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Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
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DUNS No.	041064767 - 0

2010

HUD Goals	**Policy Priority**	**Needs**	**Services/Activities**	**Measures**			**Outcomes**	**Measures**			**Evaluation Tools**
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Policy		Planning	Programming	**Pre**	**Post**	**YTD**	Impact	**Pre**	**Post**	**YTD**	Accountability
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eLogic Model® | ***Year 1*** | ***OMB Approval 2535-0114 exp. 2/28/2011***

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DUNS No.	041064767 - 0

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1		2	3	4			5	6			7
Policy		Planning	Programming	**Pre**	**Post**	**YTD**	Impact	**Pre**	**Post**	**YTD**	Accountability
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eLogic Model® **Year 1** *OMB Approval 2535-0114 exp. 2/28/2011*

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Program Component	
Project Name	aeroallergens and trafic-related air pollution in the development of childre
Reporting Period	
Reporting Start Date	
Reporting End Date	
DUNS No.	041064767 - 0

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2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
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eLogic Model®

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CCR Doing Business As Name	0
HUD Program	Healthy Homes Technical Studies
Program Component	
Project Name	aeroallergens and trafic-related air pollution in the development of childre
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DUNS No. 041064767 - 0

2010

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1		2	3	4			5	6			7
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eLogic Model®

Year 2

OMB Approval 2535-0114 exp. 2/28/2011

Applicant Legal Name University of Cincinnati

CCR Doing Business As Name 0

HUD Program Healthy Homes Technical Studies | **Reporting Period**

Program Component | **Reporting Start Date** | **DUNS No.** 041064767 - 0

Project Name o aeroallergens and trafic-related air pollution in the development of childrern | **Reporting End Date**

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
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			Research-Scientific manuscript submitted to HUD |Manuscript	Manuscript			Research-Submitted manuscript(s) for publication |Manuscript Submitted Date	Manuscript Submitted Date			
				1				1			
			Training-Staff trained |Staff trained	Staff trained			Other |Other	Other			
				2				2			**B. Where Data Maintained**
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eLogic Model®

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1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
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Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
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HUD Program Healthy Homes Technical Studies | **Reporting Period**

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Project Name o aeroallergens and trafic-related air pollution in the development of childrern | **Reporting End Date**

2010

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1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
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Applicant Legal Name	University of Cincinnati		
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eLogic Model® | ***Year 2*** | ***OMB Approval 2535-0114 exp. 2/28/2011***

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eLogic Model® **Year 2** *OMB Approval 2535-0114 exp. 2/28/2011*

CAMP

Applicant Legal Name University of Cincinnati

CCR Doing Business As Name 0

HUD Program Healthy Homes Technical Studies **Reporting Period**

Program Component **Reporting Start Date** **DUNS No.** 041064767 - 0

Project Name o aeroallergens and trafic-related air pollution in the development of childrern **Reporting End Date**

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
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				#VALUE!				#VALUE!			
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				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			

eLogic Model® **Year 2** *OMB Approval 2535-0114 exp. 2/28/2011*

Applicant Legal Name University of Cincinnati

CCR Doing Business As Name 0

HUD Program Healthy Homes Technical Studies **Reporting Period**

Program Component **Reporting Start Date** **DUNS No.** 041064767 - 0

Project Name o aeroallergens and trafic-related air pollution in the development of childrern **Reporting End Date**

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			

eLogic Model®

Year 3

OMB Approval 2535-0114 exp. 2/28/2011

Applicant Legal Name University of Cincinnati

CCR Doing Business As Name 0

HUD Program Healthy Homes Technical Studies | **Reporting Period**

Program Component | **Reporting Start Date** | **DUNS No.** 041064767 - 0

Project Name o aeroallergens and trafic-related air pollution in the development of childrern | **Reporting End Date**

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			
											A. Tools for Measurement
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
											B. Where Data Maintained
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
											C. Source of Data
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
											D. Frequency of Collection

eLogic Model®

Year 3

OMB Approval 2535-0114 exp. 2/28/2011

Applicant Legal Name University of Cincinnati

CCR Doing Business As Name 0

HUD Program Healthy Homes Technical Studies | **Reporting Period**

Program Component | **Reporting Start Date** | **DUNS No.** 041064767 - 0

Project Name o aeroallergens and trafic-related air pollution in the development of childrern | **Reporting End Date**

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
											E. Processing of Data
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
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				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			

eLogic Model® **Year 3** ***OMB Approval 2535-0114 exp. 2/28/2011***

Applicant Legal Name	University of Cincinnati
CCR Doing Business As Name	0
HUD Program	Healthy Homes Technical Studies
Program Component	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern
Reporting Period	
Reporting Start Date	
Reporting End Date	

DUNS No. 041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
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					#VALUE!				#VALUE!		
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					#VALUE!				#VALUE!		
					#VALUE!				#VALUE!		

eLogic Model®

Year 3

OMB Approval 2535-0114 exp. 2/28/2011

Applicant Legal Name	University of Cincinnati		
CCR Doing Business As Name	0		
HUD Program	Healthy Homes Technical Studies	**Reporting Period**	
Program Component		**Reporting Start Date**	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern	**Reporting End Date**	

DUNS No. 041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
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				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			

eLogic Model® **Year 3** *OMB Approval 2535-0114 exp. 2/28/2011*

Applicant Legal Name	University of Cincinnati
CCR Doing Business As Name	0
HUD Program	Healthy Homes Technical Studies
Program Component	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern
Reporting Period	
Reporting Start Date	
Reporting End Date	
DUNS No.	041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
					#VALUE!				#VALUE!		
					#VALUE!				#VALUE!		
					#VALUE!				#VALUE!		
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					#VALUE!				#VALUE!		
					#VALUE!				#VALUE!		
					#VALUE!				#VALUE!		

eLogic Model®

Year 3

OMB Approval 2535-0114 exp. 2/28/2011

Applicant Legal Name	University of Cincinnati
CCR Doing Business As Name	0
HUD Program	Healthy Homes Technical Studies
Program Component	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern
Reporting Period	
Reporting Start Date	
Reporting End Date	

DUNS No. 041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
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				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			

eLogic Model®

Year 3

OMB Approval 2535-0114 exp. 2/28/2011

Applicant Legal Name University of Cincinnati
CCR Doing Business As Name 0
HUD Program Healthy Homes Technical Studies
Reporting Period
Program Component
Reporting Start Date
DUNS No. 041064767 - 0
Project Name o aeroallergens and trafic-related air pollution in the development of childrern
Reporting End Date

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
					#VALUE!				#VALUE!		
					#VALUE!				#VALUE!		
					#VALUE!				#VALUE!		
					#VALUE!				#VALUE!		
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					#VALUE!				#VALUE!		
					#VALUE!				#VALUE!		
					#VALUE!				#VALUE!		

eLogic Model®

Year 3

OMB Approval 2535-0114 exp. 2/28/2011

Applicant Legal Name University of Cincinnati

CCR Doing Business As Name 0

HUD Program Healthy Homes Technical Studies

Reporting Period

Program Component

Reporting Start Date

DUNS No. 041064767 - 0

Project Name o aeroallergens and trafic-related air pollution in the development of childrern

Reporting End Date

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			
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eLogic Model®

Year 3

OMB Approval 2535-0114 exp. 2/28/2011

Applicant Legal Name	University of Cincinnati		
CCR Doing Business As Name	0		
HUD Program	Healthy Homes Technical Studies	**Reporting Period**	
Program Component		**Reporting Start Date**	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern	**Reporting End Date**	

DUNS No. 041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	**Pre**	**Post**	**YTD**	Impact	**Pre**	**Post**	**YTD**	Accountability
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			

eLogic Model® **Year 3** *OMB Approval 2535-0114 exp. 2/28/2011*

Applicant Legal Name University of Cincinnati

CCR Doing Business As Name 0

HUD Program Healthy Homes Technical Studies

Program Component

Project Name o aeroallergens and trafic-related air pollution in the development of childrern

Reporting Period

Reporting Start Date

Reporting End Date

DUNS No. 041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			
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				#VALUE!				#VALUE!			

eLogic Model® **Year 3** *OMB Approval 2535-0114 exp. 2/28/2011*

Applicant Legal Name	University of Cincinnati
CCR Doing Business As Name	0
HUD Program	Healthy Homes Technical Studies
Program Component	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern
Reporting Period	
Reporting Start Date	
Reporting End Date	
DUNS No.	041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			

eLogic Model® **Year 3** *OMB Approval 2535-0114 exp. 2/28/2011*

Applicant Legal Name	University of Cincinnati
CCR Doing Business As Name	0
HUD Program	Healthy Homes Technical Studies
Program Component	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern
Reporting Period	
Reporting Start Date	
Reporting End Date	
DUNS No.	041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			
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eLogic Model®

Total

OMB Approval 2535-0114 exp. 2/28/2011

Applicant Legal Name University of Cincinnati

CCR Doing Business As Name 0

HUD Program Healthy Homes Technical Studies | **Reporting Period**

Program Component | **Reporting Start Date** | **DUNS No.** 041064767 - 0

Project Name o aeroallergens and trafic-related air pollution in the development of childrern | **Reporting End Date**

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
			Housing-Housing interventions completed-Healthy homes |Units	Units			Research-Data analysis completed |Completed	Completed			
				176				176			**A. Tools for Measurement**
			Outreach-Outreach and education-Sessions |Sessions	Sessions			Other |Other	Other			Questionnaire
				2							Survey
			Research-Scientific manuscript submitted to HUD |Manuscript	Manuscript			Research-Submitted manuscript(s) for publication |Manuscript Submitted Date	Manuscript Submitted Date			
				2				2			
			Training-Staff trained |Staff trained	Staff trained			Other |Other	Other		
				4				4			**B. Where Data Maintained**
				#VALUE!				#VALUE!			Specialized database
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
											C. Source of Data
				#VALUE!				#VALUE!			Inspection results
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
											D. Frequency of Collection

eLogic Model®

Total

OMB Approval 2535-0114 exp. 2/28/2011

Applicant Legal Name University of Cincinnati

CCR Doing Business As Name 0

HUD Program Healthy Homes Technical Studies | **Reporting Period**

Program Component | **Reporting Start Date** | **DUNS No.** 041064767 - 0

Project Name o aeroallergens and trafic-related air pollution in the development of childrern | **Reporting End Date**

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			Annually
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
											E. Processing of Data
				#VALUE!				#VALUE!			Statistical database
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			

eLogic Model®

Total

OMB Approval 2535-0114 exp. 2/28/2011

Applicant Legal Name	University of Cincinnati
CCR Doing Business As Name	0
HUD Program	Healthy Homes Technical Studies
Program Component	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern
Reporting Period	
Reporting Start Date	
Reporting End Date	
DUNS No.	041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			
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				#VALUE!				#VALUE!			
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eLogic Model® **_Total_** ***OMB Approval 2535-0114 exp. 2/28/2011***

Applicant Legal Name	University of Cincinnati
CCR Doing Business As Name	0
HUD Program	Healthy Homes Technical Studies
Program Component	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern
Reporting Period	
Reporting Start Date	
Reporting End Date	
DUNS No.	041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
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eLogic Model® **Total** *OMB Approval 2535-0114 exp. 2/28/2011*

Applicant Legal Name	University of Cincinnati
CCR Doing Business As Name	0
HUD Program	Healthy Homes Technical Studies
Program Component	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern
Reporting Period	
Reporting Start Date	
Reporting End Date	
DUNS No.	041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
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eLogic Model® **_Total_** ***OMB Approval 2535-0114 exp. 2/28/2011***

Applicant Legal Name	University of Cincinnati
CCR Doing Business As Name	0
HUD Program	Healthy Homes Technical Studies
Program Component	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern
Reporting Period	
Reporting Start Date	
Reporting End Date	
DUNS No.	041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
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eLogic Model®

Total

OMB Approval 2535-0114 exp. 2/28/2011

2010

Applicant Legal Name	University of Cincinnati
CCR Doing Business As Name	0
HUD Program	Healthy Homes Technical Studies
Program Component	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern
Reporting Period	
Reporting Start Date	
Reporting End Date	
DUNS No.	041064767 - 0

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
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eLogic Model® **Total** ***OMB Approval 2535-0114 exp. 2/28/2011***

Applicant Legal Name University of Cincinnati

CCR Doing Business As Name 0

HUD Program Healthy Homes Technical Studies **Reporting Period**

Program Component **Reporting Start Date**

Project Name o aeroallergens and trafic-related air pollution in the development of childrern **Reporting End Date**

DUNS No. 041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
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eLogic Model® | ***Total*** | *OMB Approval 2535-0114 exp. 2/28/2011*

Applicant Legal Name	University of Cincinnati
CCR Doing Business As Name	0
HUD Program	Healthy Homes Technical Studies
Program Component	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern
Reporting Period	
Reporting Start Date	
Reporting End Date	
DUNS No.	041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
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eLogic Model®

Total

OMB Approval 2535-0114 exp. 2/28/2011

Applicant Legal Name	University of Cincinnati		
CCR Doing Business As Name	0		
HUD Program	Healthy Homes Technical Studies	**Reporting Period**	
Program Component		**Reporting Start Date**	
Project Name	o aeroallergens and trafic-related air pollution in the development of childrern	**Reporting End Date**	

DUNS No. 041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
				#VALUE!				#VALUE!			
				#VALUE!				#VALUE!			
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				#VALUE!				#VALUE!			

eLogic Model® ***Total*** ***OMB Approval 2535-0114 exp. 2/28/2011***

Applicant Legal Name University of Cincinnati

CCR Doing Business As Name 0

HUD Program Healthy Homes Technical Studies **Reporting Period**

Program Component **Reporting Start Date**

Project Name o aeroallergens and trafic-related air pollution in the development of children **Reporting End Date**

DUNS No. 041064767 - 0

2010

HUD Goals	Policy Priority	Needs	Services/Activities	Measures			Outcomes	Measures			Evaluation Tools
1		2	3	4			5	6			7
Policy		Planning	Programming	Pre	Post	YTD	Impact	Pre	Post	YTD	Accountability
					#VALUE!				#VALUE!		
					#VALUE!				#VALUE!		
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					#VALUE!				#VALUE!		
					#VALUE!				#VALUE!		
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					#VALUE!				#VALUE!		
					#VALUE!				#VALUE!		

HUD Goals	
1A	**Strengthen the Nation's Housing Market to Bolster the Economy and Protect Consumers** (1A) Stem the foreclosure crisis.
1B	**Strengthen the Nation's Housing Market to Bolster the Economy and Protect Consumer** (1B) Protect and educate consumers when they buy, refinance or rent a home.
1C	**Strengthen the Nation's Housing Market to Bolster the Economy and Protect Consumers** (1C) Create financially sustainable homeownership opportunities.
1D	**Strengthen the Nation's Housing Market to Bolster the Economy and Protect Consumers** (1D) Establish an accountable and sustainable housing finance system.
2A	**Meet the Need for Quality Affordable Rental Homes** (2A) End homelessness and substantially reduce the number of families and individuals with severe housing needs.
2B	**Meet the Need for Quality Affordable Rental Homes** (2B) Expand the supply of affordable rental homes where most needed.
2C	**Meet the Need for Quality Affordable Rental Homes** (2C) Preserve the affordability and improve the quality of federally assisted and private unassisted affordable rental homes.
2D	**Meet the Need for Quality Affordable Rental Homes** (2D) Expand families' choices of affordable rental homes located in a broad range of communities.
3A	**Utilize Housing as a Platform for Improving Quality of Life** (3A) Utilize HUD assistance to improve educational outcomes and early learning and development.
3B	**Utilize Housing as a Platform for Improving Quality of Life** (3B) Utilize HUD assistance to improve health outcomes.
3C	**Utilize Housing as a Platform for Improving Quality of Life** (3C) Utilize HUD assistance to increase economic security and self-sufficiency.
3D	**Utilize Housing as a Platform for Improving Quality of Life** (3D) Utilize HUD assistance to improve housing stability through supportive services for vulnerable populations including the elderly, people with disabilities, homeless people, and those individuals and families at risk of becoming homeless.
3E	**Utilize Housing as a Platform for Improving Quality of Life** (3E) Utilize HUD assistance to improve public safety.
4A	**Build Inclusive and Sustainable Communities Free from Discrimination** (4A) Catalyze economic development and job creation, while enhancing and preserving community assets.
4B	**Build Inclusive and Sustainable Communities Free from Discrimination** (4B) Promote energy efficient buildings and location efficient communities that are healthy, affordable and diverse.
4C	**Build Inclusive and Sustainable Communities Free from Discrimination** (4C) Ensure open, diverse, and equitable communities.
4D	**Build Inclusive and Sustainable Communities Free from Discrimination** (4D) Facilitate disaster preparedness, recovery and resiliency.
4E	**Build Inclusive and Sustainable Communities Free from Discrimination** (4E) Build the capacity of local, state and regional public and private organizations.
5A	**Transform the Way HUD Does Business** (5A) Build Capacity: Create a flexible and high performing learning organization with a motivated, skilled workforce.
5B	**Transform the Way HUD Does Business** (5B) Focus on Results: Create an empowered organization that is customer-centered, place based, collaborative, and responsive to employee feedback and focused on results.

HUD Priorities	
1a	**Job Creation/Employment** (1a) Improving access to job opportunities through information sharing, coordination with federal, state, and local entities, and other means.
1b	**Job Creation/Employment** (1b) Increasing access to job training, career services, and work, supports through coordination with federal, state, and local entities.
1c	**Job Creation/Employment** (1c) Expanding economic and job creation opportunities for low-income residents and creating better transportation access to those jobs and other economic opportunities by partnering with federal and nonprofit agencies, private industry, and planning and economic development organizations and by leveraging federal and private resources.
2a	**Sustainability** (2a) Promote and preserve community assets including small businesses, fresh food markets, parks, hospitals, and quality schools by incentivizing comprehensive and inclusive local economic development planning.
2b	**Sustainability** (2b) Give consumers more information about the true cost of living by incorporating both housing and transportation costs into measures of affordability.
2c	**Sustainability** (2c) Improve residents' health and safety, particularly that of children and other vulnerable populations, by promoting green and healthy design, construction, rehabilitation, and maintenance of housing and communities.
2d	**Sustainability** (2d) Support and promote an energy-efficient, green, and healthy housing market by retrofitting existing housing, supporting energy-efficient new construction, improving home energy labeling, and promoting financing products that reduce the carbon footprint of non-HUD-supported residential buildings.
2e	**Sustainability** (2e) Reduce energy consumption and incorporate green building practices in the design and operation of HUD-supported affordable housing.
2f	**Sustainability** (2f) Promote coordinated planning, integrating federal resources, and targeting technical assistance at the local, state, and regional levels for sustainable housing and communities.
2g	**Sustainability** (2g) Promote the design and construction of buildings and communities that are accessible and visitable by people with disabilities.
2h	**Sustainability** (2h) Promote the use of climate-resilient and disaster-resistant building design, construction and siting.
2i	**Sustainability** (2i) Encourage metropolitan and regional focus in planning and community development.
3a	**Affirmatively Furthering Fair Housing** (3a) Regional coordination of affirmatively furthering fair housing plans, including such activities as developing regional analyses of impediments.
3b	**Affirmatively Furthering Fair Housing** (3b) Regional strategies to reduce racially segregated living patterns and other effects of formely de jure segregated public or assisted housing in metropolitan areas with a year 2000 dissimilarity index of 70 or higher and where the minority population is at least 20,000 or 3 percent of the total population in the Core Based Statistical Area (CBSA), whichever is greater.
3c	**Affirmatively Furthering Fair Housing** (3c) Decreasing the concentration of poverty and racial segregation in neighborhoods and communities through strategic targeting of resources.
3d	**Affirmatively Furthering Fair Housing** (3d) Promoting visitability for persons with disabilities in single-family housing.
4a	**Capacity Building and Knowledge Sharing** (4a) Develop, target and deliver technical assistance for increasing affordability in areas experiencing increased rental costs due to development.
4b	**Capacity Building and Knowledge Sharing** (4b) Strengthen the capacity of state and local partners, including governments and nonprofit organizations, to implement HUD programs, participate in decision making and planning processes, and coordinate on cross-programmatic, place-based approaches through grantmaking and technical assistance.
4c	**Capacity Building and Knowledge Sharing** (4c) Support knowledge sharing and innovation by disseminating best practices, encouraging peer learning, publishing data analysis and research, and helping to incubate and test new ideas.
5a	**Using Housing as a Platform for Improving Other Outcomes** (5a) Increasing access to high quality early learning programs and services through coordination with local programs.

5C	**Transform the Way HUD Does Business** (5C) Bureaucracy Busting: Create flexible, modern rules and systems that promote responsiveness, openness and transparency.
5D	**Transform the Way HUD Does Business** (5D) Culture Change: Create a healthy, open, flexible work environment that reflects the values of HUD's mission.

5b	**Using Housing as a Platform for Improving Other Outcomes** (5b) Providing physical space to co-locate healthcare and wellness services with housing (e.g., on-site health clinics).
5c	**Using Housing as a Platform for Improving Other Outcomes** (5c) Increasing access to public benefits (such as Temporary Assistance to Needy Families and Supplemental Security Income) through outreach and other means.
5d	**Using Housing as a Platform for Improving Other Outcomes** (5d) Maintaining or improving the physical environment and design of HUD-assisted residences, giving attention to physical safety and crime prevention.
5e	**Using Housing as a Platform for Improving Other Outcomes** (5e) Providing mobility counseling to increase access to neighborhoods of opportunity.
6a	**Expand Cross-Cutting Policy Knowledge (6a)** Support knowledge sharing and innovation by disseminating best practices, encouraging peer learning, publishing data analysis and research, and helping to incubate and test new ideas.

CAMP eLogic Model®

Column 2

NEEDS
There is a need for more efficient, effective and less costly methods to evaluate (test for, identify) and control (mitigate) lead-based paint hazards.

CAMP eLogic Model®	*Click here to allow deletion of 'New' Activities*
Column 3	
SERVICES/ACTIVITIES	**UNITS**
Business Opportunities-Other-Green-Businesses |Businesses	Businesses
Business Opportunities-Other-Green-Dollars |Dollars	Dollars
Business Opportunities-Section 3-Green Businesses |Businesses	Businesses
Business Opportunities-Section 3-Green-Dollars |Dollars	Dollars
Employment Opportunities-Other-Green-Jobs created |FTE Jobs	FTE Jobs
Employment Opportunities-Other-Green-Jobs retained |FTE Jobs	FTE Jobs
Employment Opportunities-Section 3-Green-Jobs created |FTE Jobs	FTE Jobs
Employment Opportunities-Section 3-Green-Jobs retained |FTE Jobs	FTE Jobs
Employment Opportunities-Section 3-Persons placed |Persons	Persons
Housing-Housing assessments-Healthy homes |Assessments	Assessments
Housing-Housing assessments-Healthy homes-Incorporate Green standards |Assessments	Assessments
Housing-Housing interventions completed-Healthy homes |Units	Units
Housing-Housing interventions completed-Lead |Units	Units
Housing-Housing interventions incorporate energy efficiency measures |Units	Units
Outreach-Community participant's meetings for input/feedback-Meetings |Meetings	Meetings
Outreach-Community participants' meetings for input/feedback -Participants |Participants	Participants
Outreach-Outreach and education-Participants |Participants	Participants
Outreach-Outreach and education-Sessions |Sessions	Sessions
Research-Development on efficacy of methods for integrated pest management |Evaluations	Evaluations
Research-Development on evaluating contaminant or injury control measures |Evaluations	Evaluations
Research-Development on assessing impacts of green practices on indoor environmental quality or health |Evaluations	Evaluations
Policy Priority-Capacity Building and Information Sharing-Development of a plan to disseminate program results and effective practices |Date	Date
Policy Priority-Capacity Building and Information Sharing-Presentation of program results at an academic and/or professional conference |Presentation	Presentation
Policy Priority-Housing to Improve Other Outcomes-Creation of tools or protocols to improve health outcomes in target populations |Tools/protocols	Tools/protocols
Policy Priority-Partner organizations commit to applying findings to improve health outcomes in their populations |Commitments	Commitments
Research-Scientific manuscript submitted to HUD |Manuscript	Manuscript
Training Opportunities-Green Other-Sessions |Sessions	Sessions
Training Opportunities-Green Section 3-Persons |Persons	Persons
Training Opportunities-Green Section 3-Sessions |Sessions	Sessions
Training-Staff trained |Staff trained	Staff trained
Other |Other	

CAMP eLogic Model®	*Click here to allow deletion of 'New' Outcomes*
Column 5	
OUTCOMES	**UNITS**
Health-Reduction in housing related health hazards-Improved health |Persons	Persons
Health-Reduction in housing related health hazards-Improved safety |Avg. Hazard Score	Avg. Hazard Score
Health-Reduction in housing related health hazards-Reduced air contaminants-Total VOCs |Avg. Concentration	Avg. Concentration
Health-Reduction in housing related health hazards-Reduced allergens-Cockroach-Load |Avg. Floor Loading	Avg. Floor Loading
Health-Reduction in housing related health hazards-Reduced allergens-Cockroach-Conc |Avg. Concentration	Avg. Concentration
Health-Reduction in housing related health hazards-Reduced allergens-Cockroach-Other |Avg. Other	Avg. Other
Health-Reduction in housing related health hazards-Reduced allergens-Dust mite-Load |Avg. Floor Loading	Avg. Floor Loading
Health-Reduction in housing related health hazards-Reduced allergens-Dust mite-Conc |Avg. Concentration	Avg. Concentration
Health-Reduction in housing related health hazards-Reduced allergens-Dust mite-Other |Avg. Other	Avg. Other
Health-Reduction in housing related health hazards-Reduced allergens-Mice-Load |Avg. Floor Loading	Avg. Floor Loading
Health-Reduction in housing related health hazards-Reduced allergens-Mice-Conc |Avg. Concentration	Avg. Concentration
Health-Reduction in housing related health hazards-Reduced allergens-Mice-Other |Avg. Other	Avg. Other
Health-Reduction in housing related health hazards-Reduced allergens-Mold-Load |Avg. Floor Loading	Avg. Floor Loading
Health-Reduction in housing related health hazards-Reduced allergens-Mold-Conc |Avg. Concentration	Avg. Concentration
Health-Reduction in housing related health hazards-Reduced allergens-Mold-CFU/m3 |Avg. CFU/m3	Avg. CFU/m^3
Health-Reduction in housing related health hazards-Reduced allergens-Mold-Other |Avg. Other	Avg. Other
Health-Reduction in housing related health hazards-Reduced allergens-Other-Load |Avg. Floor Loading	Avg. Floor Loading
Health-Reduction in housing related health hazards-Reduced allergens-Other-Conc |Avg. Concentration	Avg. Concentration
Health-Reduction in housing related health hazards-Reduced allergens-Other-Other |Avg. Other	Avg. Other
Health-Reduction in housing related health hazards-Reduced allergens-Rat-Load |Avg. Floor Loading	Avg. Floor Loading
Health-Reduction in housing related health hazards-Reduced allergens-Rat-Conc |Avg. Concentration	Avg. Concentration
Health-Reduction in housing related health hazards-Reduced allergens-Rat-Other |Avg. Other	Avg. Other
Health-Reduction in housing related health hazards-Reduced respirable particulates |Avg. Concentration	Avg. Concentration
Health-Reduction in housing related lead hazards-Persons |Persons	Persons

Health-Reduction in housing related lead hazards-Reduced Pb-Change above EPA standard-Floor dust |% above standard	% above standard
Health-Reduction in housing related lead hazards-Reduced Pb-Change above EPA standard-sill dust |% above standard	% above standard
Health-Reduction in housing related lead hazards-Reduced Pb-Change above EPA standard-average soil |% above standard	% above standard
Health-Reduction-Incidence/severity-Asthma exacerbation |Physician visits	Physician visits
Health-Reduction-incidence/severity-Asthma-Emergency Room (ER) visits |ER visits	ER visits
Health-Reduction-Incidence/severity-Asthma-Hospitalization days |Hospitalization days	Hospitalization days
Health-Reduction-Incidence/severity-Asthma-Other |Other	Other
Health-Reduction-Incidence/severity-Asthma-Sick days |Sick days	Sick days
Health-Reduction-Incidence/severity-Asthma-Symptom days |Symptom days	Symptom days
Research-Data analysis completed |Completed	Completed
Research-Final project report |Accepted	Accepted
Research-Hazard assessment method developed-Other |Other	Other
Research-Hazard assessment method developed-Reduced cost |Dollars	Dollars
Research-Hazard assessment method developed-Reduced time |Hours	Hours
Research-Hazard intervention protocols developed-Other |Other	Other
Research-Hazard intervention protocols developed-Reduced cost |Dollars	Dollars
Research-Hazard intervention protocols developed-Reduced time |Hours	Hours
Research-New technologies developed |Technology	Technology
Research-New/Improved assessment tool-Housing health hazards |Tools	Tools
Research-New/improved technologies developed-Reduced cost |Dollars	Dollars
Research-New/Improved technologies developed-Reduced time |Reduced hours	Reduced hours
Research-New/Improved technologies-Precision/accuracy-% change in coefficient of variation |% change	% change
Research-Assessments of efficacy of methods for Integrated Pest Management |Assessments	Assessments
Research-Assessments of contaminant or injury control measures |Assessments	Assessments
Research-Assessments of impacts of green practices on indoor environmental quality or health |Assessments	Assessments
Policy Priority-Capacity Building and Knowledge Sharing-Dissemination of program results and effective practices |Date	Date
Policy Priority-Capacity Building and Knowledge Sharing-Presentation(s) of program results at an academic and/or professional conference |Presentation(s)	Presentation(s)
Policy Priority-Capacity Building and Knowledge Sharing-Use of tools or protocols that improve health outcomes in target populations |Tools/protocols	Tools/protocols
Policy Priority-Capacity Building and Knowledge Sharing-Partner organizations implement findings to improve health outcomes in populations they serve |Implementations	Implementations
Policy Priority-Capacity Building and Knowledge Sharing-Number of Partner Organizations implementing at least one new activity as a result of the research |Partners	Partners
Research-Submitted manuscript(s) accepted by HUD |Manuscript Accepted Date	Manuscript Accepted Date

Research-Submitted manuscript(s) for publication |Manuscript Submitted Date	Manuscript Submitted
Research-Submitted manuscript(s) published |Manuscript Published Date	Manuscript Published
Other |Other	

CAMP eLogic Model®

A. Tools For Measurement
Bank accounts
Construction log
Database
Enforcement log
Financial aid log
Intake log
Interviews
Mgt. Info. System-automated
Mgt. Info. System-manual
Outcome scale(s)
Phone log
Plans
Pre-post tests
Post tests
Program specific form(s)
Questionnaire
Recruitment log
Survey
Technical assistance log
Time sheets
B. Where Data Maintained
Agency database
Centralized database
Individual case records
Local precinct
Public database
School
Specialized database
Tax Assessor database
Training center
C. Source of Data
Audit report
Business licenses
Certificate of Occupancy
Code violation reports
Counseling reports
Employment records
Engineering reports
Environmental reports
Escrow accounts
Financial reports
GED certification/diploma
Health records
HMIS
Inspection results
Lease agreements
Legal documents
Loan monitoring reports
Mortgage documents
Payment vouchers
Permits issued
Placements
Progress reports
Referrals
Sale documents
Site reports
Statistics
Tax assessments
Testing results
Waiting lists
Work plan reports
D. Frequency of Collection
Daily
Weekly
Monthly
Quarterly
Biannually
Annually
Upon incident
E. Processing of Data
Computer spreadsheets
Flat file database
Manual tallies
Relational database
Statistical database

Carter-Richmond Methodology

The Management Questions developed for your program are based on the Carter-Richmond Methodology.* A description of the Carter-Richmond Methodology appears in the General Section of the NOFA.

* © The Accountable Agency – How to Evaluate the Effectiveness of Public and Private Programs," Reginald Carter, ISBN Number 9780978724924

Evaluation Process
An evaluation process will be part of the on-going management of the program.

The following are standard requirements that HUD expects of every program manager as part of their project management.

• Comparisons will be made between projected and actual numbers for both outputs and outcomes.
• Deviations from projected outputs and outcomes will be documented and explained on space provided on the "Reporting" Tab.
• Analyze data to determine relationship of outputs to outcomes; what outputs produce which outcomes.

The reporting requirements are specified in the program specific NOFA and your funding award.

HUD Will Use The Following Management Questions To Evaluate Your Program:

Response to Management Questions

	(Use the fields below to provide three to five answers to the questions listed)	Measure	Answer
1A.	Briefly describe the specific problem addressed in your research.	A. Problem Addressed	
1B.	Briefly describe the specific problem addressed in your research.	B. Problem Addressed	
1C	Briefly describe the specific problem addressed in your research.	C. Problem Addressed	
1D	Briefly describe the specific problem addressed in your research.	D. Problem Addressed	
1E	Briefly describe the specific problem addressed in your research.	E. Problem Addressed	
2A	What method(s) were used to address the problem identified in response to 1A.?	Method	
2B	What method(s) were used to address the problem identified in response to 1B.?	Method	
2C	What method(s) were used to address the problem identified in response to 1C.?	Method	
2D	What method(s) were used to address the problem identified in response to 1D.?	Method	
2E	What method(s) were used to address the problem identified in response to 1E.?	Method	
3	Briefly identify the target population for the research	Population	
4	What conclusions can be drawn as a result of the application of your research on lead hazard control practices with regard to evaluation and/or mitigation? (250 word maximum)	Conclusion	

In the fields below identify 3-5 major findings of your research. To the extent possible, please relate your findings to the problems and methods identified previously			
5A	Major Finding From Your Research	A. Finding	
5B	Major Finding From Your Research	B. Finding	
5C	Major Finding From Your Research	C. Finding	
5D	Major Finding From Your Research	D. Finding	
5E	Major Finding From Your Research	E. Finding	
6	Policy Priority- Using the field to the right in column D-H, identify how and where you disseminated information on program results and effective practices resulting from the research. In the cells below provide the dates of manuscripts submitted, conferences or symposiums where you presneted your research	Discription on how and where you disseminated information	
6A	Journals (Submitted manuscript(s) for publication):	Date	
6B	Journals (Submitted manuscript(s) for publication):	Date	
6C	Conferences/Symposiums (Submitted platform/poster presentation(s) for publication):	Date	
6D	Conferences/Symposiums (Submitted platform/poster presentation(s) for publication):	Date	
7A	Policy Priority-Identify partner organization which will (have) implement(ed) findings to improve health outcomes in populations they serve resulting from the research.	Partner organization name:	
7a	**Please describe the population this organization is serving in cells D-H.**	Population	
7a1	How many persons receiving services are under the age of 6?	Persons	
7a2	How many persons receiving services are ages 6-17?	Persons	
7a3	How many persons receiving services are ages 18-30?	Persons	
7a4	How many persons receiving services are ages 31-50?	Persons	
7a5	How many persons receiving services are ages 51-61?	Persons	
7a6	How many persons receiving services are ages 62 and older?	Persons	
7B	Policy Priority-Identify partner organization which will (have) implement(ed) findings to improve health outcomes in populations they serve resulting from the research.	Partner organization name:	
7b	**Please describe the population this organization is serving?**	Population	
7b1	How many persons receiving services are under the age of 6?	Persons	
7b2	How many persons receiving services are ages 6-17?	Persons	
7b3	How many persons receiving services are ages 18-30?	Persons	
7b4	How many persons receiving services are ages 31-50?	Persons	
7b5	How many persons receiving services are ages 51-61?	Persons	
7b6	How many persons receiving services are ages 62 and older?	Persons	
7C	Policy Priority-Identify partner organization which will (have) implement(ed) findings to improve health outcomes in populations they serve resulting from the research.	Partner organization name:	
7c	**Please describe the population this organization is serving?**	Population	
7c1	How many persons receiving services are under the age of 6?	Persons	
7c2	How many persons receiving services are ages 6-17?	Persons	
7c3	How many persons receiving services are ages 18-30?	Persons	
7c4	How many persons receiving services are ages 31-50?	Persons	
7c5	How many persons receiving services are ages 51-61?	Persons	
7c6	How many persons receiving services are ages 62 and older?	Persons	
7D	Policy Priority-Identify partner organizations which will (have) implement(ed) findings to improve health outcomes in populations they serve resulting from the research. (Add further entries if needed.)	Partner organization name:	

7d	**Please describe the population this organization is serving?**	Population	
7d1	How many persons receiving services are under the age of 6?	Persons	
7d2	How many persons receiving services are ages 6-17?	Persons	
7d3	How many persons receiving services are ages 18-30?	Persons	
7d4	How many persons receiving services are ages 31-50?	Persons	
7d5	How many persons receiving services are ages 51-61?	Persons	
7d6	How many persons receiving services are ages 62 and older?	Persons	
7E	Policy Priority-Identify partner organizations which will (have) implement(ed) findings to improve health outcomes in populations they serve resulting from the research. (Add further entries if needed.)	Partner organization name:	
7e	**Please describe the population this organization is serving?**	Population	
7.00E+01	How many persons receiving services are under the age of 6?	Persons	
7.00E+02	How many persons receiving services are ages 6-17?	Persons	
7b	How many persons receiving services are ages 18-30?	Persons	
7b	How many persons receiving services are ages 31-50?	Persons	
7b	How many persons receiving services are ages 51-61?	Persons	
7b	How many persons receiving services are ages 62 and older?	Persons	

Explanation of Any Deviations From the Approved eLogic Model®

OMB Approval No. 2501-001

Grant Application Detailed Budget Worksheet

(Exp. 03/31/2011)

Name and Address of Applicant:

HUD (OHHLHC) CFDA: 14.906

If subgrantee/contractor's worksheet, name of prime:

Public reporting burden for this collection of information is estimated to average 3 hours 12 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. This agency may not collect this information, and you are not required to complete this form, unless it displays a currently valid OMB control number. Information collected will provide proposed budget data for multiple HUD (OHHLHC)s. HUD will use this information in the selection of applicants. Response to this request for information is required in order to receive the benefits to be derived. The information requested does not lend itself to confidentiality.

Category **Detailed Description of Budget (for full grant period)**

1. Personnel (Direct Labor)	**Estimated Hours**	**Rate per Hour**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
Position or Individual											
Reponen	416	$58.77	$24,448	$24,448							
Grinshpun	208	$71.97	$14,970	$14,970							
Levin	416	$48.14	$20,026	$20,026							
Ryan	832	$37.55	$31,242	$31,242							
Indugula	416	$15.92	$6,623	$6,623							
Zheng	1,165	$20.35	$23,708	$23,708							
			$0								
			$0								
			$0								
Total Direct Labor Cost			**$121,016**	**$121,017**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

2. Fringe Benefits	**Rate (%)**	**Base**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
Reponen	30.25%	$24,448	$7,396	$7,396							
Grinshpun	30.25%	$14,970	$4,528	$4,528							
Levin	30.25%	$20,026	$6,058	$6,058							
Ryan	30.25%	$31,242	$9,451	$9,451							
Indugula	31.41%	$6,623	$2,080	$2,080							
Zheng	31.41%	$23,708	$7,447	$7,447							
			$0								
Total Fringe Benefits Cost			**$36,959**	**$36,960**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

3. Travel

3a. Transportation - Local Private Vehicle	**Mileage**	**Rate per Mile**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
			$0								
			$0								
			$0								
Subtotal - Trans - Local Private Vehicle			$0	$0	$0	$0	$0	$0	$0	$0	$0

Grant Application Detailed Budget Worksheet				Applicant:							
Detailed Description of Budget											
3b. Transportation - Airfare (show destination)	**Trips**	**Fare**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
			$0								
			$0								
			$0								
Subtotal - Transportation - Airfare			$0	$0	$0	$0	$0	$0	$0	$0	$0
3c. Transportation - Other	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
One trip to HUD (for 2 investigators) Year-1	1	$1,922.00	$1,922	$1,922							
One trip to Na. Prof. Conference (Year-1)	1	$2,362.00	$2,362	$2,362							
One trip to HUD (for 2 investigators) Year-2	1	$1,980.00	$1,980	$1,980							
One trip to Na. Prof. Conference (Year-2)	1	$2,433.00	$2,433	$2,433							
			$0								
			$0								
Subtotal - Transportation - Other			$8,697	$8,697	$0	$0	$0	$0	$0	$0	$0
3d. Per Diem or Subsistence (indicate location)	**Days**	**Rate per Day**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
			$0								
			$0								
Subtotal - Per Diem or Subsistence			$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Travel Cost			$8,697	**$8,697**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
4. Equipment (Only items over $5,000 Depreciated va	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
			$0								
Total Equipment Cost			$0	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Grant Application Detailed Budget Worksheet				Applicant:							
Detailed Description of Budget											
5. Supplies and Materials (Items under $5,000 Depreciated Value)											
5a. Consumable Supplies	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
Glucatell Kits	5	$585.00	$2,925	$2,925							
Pyrochrome Kits	10	$88.00	$880	$880							
Reagents	1	$325.00	$325	$325							
Tubes and Pipet Tips	1	$350.00	$350	$350							
			$0								
			$0								
			$0								
Subtotal - Consumable Supplies			$4,480	$4,480	$0	$0	$0	$0	$0	$0	$0
5b. Non-Consumable Materials	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
			$0								
			$0								
			$0								
Subtotal - Non-Consumable Materials			$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Supplies and Materials Cost			$4,480	**$4,480**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
6. Consultants (Type)	**Days**	**Rate per Day (Limit in General Section)**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
			$0								
			$0								
			$0								
Total Consultants Cost			$0	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
7. Contracts and Sub-Grantees (List individually)	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
			$0								
			$0								
Total Subcontracts Cost			$0	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Grant Application Detailed Budget Worksheet				Applicant:							
Detailed Description of Budget											
8. Construction Costs											
8a. Administrative and legal expenses	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
			$0								
			$0								
Subtotal - Administrative and legal expenses			$0	$0	$0	$0	$0	$0	$0	$0	$0
8b. Land, structures, rights-of way, appraisal, etc	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
			$0								
Subtotal - Land, structures, rights-of way, ...			$0	$0	$0	$0	$0	$0	$0	$0	$0
8c. Relocation expenses and payments	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
			$0								
			$0								
Subtotal - Relocation expenses and payments			$0	$0	$0	$0	$0	$0	$0	$0	$0
8d. Architectural and engineering fees	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
			$0								
			$0								
Subtotal - Architectural and engineering fees			$0	$0	$0	$0	$0	$0	$0	$0	$0
8e. Other architectural and engineering fees	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
			$0								
			$0								
Subtotal - Other architectural and engineering fees			$0	$0	$0	$0	$0	$0	$0	$0	$0

Grant Application Detailed Budget Worksheet					Applicant:						
Detailed Description of Budget											
8f. Project inspection fees	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
Subtotal - Project inspection fees			$0	$0	$0	$0	$0	$0	$0	$0	$0
8g. Site work	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
Subtotal - Site work			$0	$0	$0	$0	$0	$0	$0	$0	$0
8h. Demolition and removal	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
Subtotal - Demolition and removal			$0	$0	$0	$0	$0	$0	$0	$0	$0
8i. Construction	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
Subtotal - Construction			$0	$0	$0	$0	$0	$0	$0	$0	$0
8j. Equipment	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
			$0								
Subtotal - Equipment			$0	$0	$0	$0	$0	$0	$0	$0	$0
8k. Contingencies	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
Subtotal - Contingencies			$0	$0	$0	$0	$0	$0	$0	$0	$0
8l. Miscellaneous	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
			$0								
			$0								
			$0								
Subtotal - Miscellaneous			$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Construction Costs			$0	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Grant Application Detailed Budget Worksheet					Applicant:							
Detailed Description of Budget												
9. Other Direct Costs	**Quantity**	**Unit Cost**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
Item											
			$0								
			$0								
			$0								
			$0								
			$0								
			$0								
			$0								
			$0								
			$0								
			$0								
			$0								
			$0								
			$0								
Total Other Direct Costs			$0	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Subtotal of Direct Costs			$171,153	**$171,154**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
10. Indirect Costs	**Rate**	**Base**	**Estimated Cost**	**HUD (OHHLHC) Share**	**Applicant Contribution**	**Other HUD Funds**	**Other Federal Share**	**State Share**	**Local/Tribal Share**	**Other**	**Program Income**
Type											
F&A	57%	##########	$97,557	$97,557							
(Base = Total Direct Costs = $171,153)			$0								
			$0								
			$0								
			$0								
			$0								
Total Indirect Costs			$97,557	**$97,557**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Total Estimated Costs (Subtotal Direct + Total Indirect)			**$268,710**	**$268,711**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Grant Application Detailed Budget Worksheet

Detailed Description of Budget			
Analysis of Total Estimated Costs		**Estimated Cost**	**Percent of Total**
1	Personnel (Direct Labor)	121,016	45%
2	Fringe Benefits	36,959	14%
3	Travel	8,697	3%
4	Equipment	-	0%
5	Supplies and Materials	4,480	2%
6	Consultants	-	0%
7	Contracts and Sub-Grante	-	0%
8	Construction	-	0%
9	Other Direct Costs	-	0%
10	Indirect Costs	97,557	36%
	Total:	268,710	100%
	HUD (OHHLHC) Share:	268,711	
	Match: (as percentage of HUD Share)	-	0.000%

form **HUD-424-CBW** (2/2003)

Appendix 2. Support letters

a. Dr. Vesper, US EPA
b. Ken Sharkey, Cincinnati Health Department
c. Dr. LeMasters, University of Cincinnati

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EXPOSURE RESEARCH LABORATORY
CINCINNATI, OH 45268

October 26, 2010

OFFICE OF
RESEARCH AND DEVELOPMENT

Tiina Reponen, Ph.D., Professor
Center for Health-Related Aerosol Studies
Department of Environmental Health
University of Cincinnati
POB 670056
Cincinnati, Ohio 45267-0056, USA

RE: Your Grant application to HUD

Dear Dr. Reponen,

I am please that you are submitting a grant application to HUD to study the synergistic effect of exposure aeroallergens and traffic-related air pollution on the development of children's asthma. This will be great opportunity to expand our collaboration from effects of mold to their synergistic effects with other air contaminants. In this context, I have an interest in collaborating in the proposed study and would serve as an unpaid co-investigator to the project.

The EPA's National Exposure Research Laboratory is actively involved in indoor sampling for molds and has studied the relationship between mold exposure based on the "Environmental Relative Moldiness Index" and asthma. With this expertise, we will be happy to assist you in the mold analyses of about 140 samples as proposed in the HUD Grant and help interpret the data obtained as a result of these analyses. The value of our contribution is $28K. This translates to about $44K total cost that University of Cincinnati would have to pay if this service was purchased from an outside laboratory.

I wish you best of luck in your grant application and look forward to working with you if this application is funded.

Sincerely,

Stephen Vesper, Ph.D.
Molecular Microbiologist

In Support of Rating Factors 2,3 & 4

city of
CINCINNATI
HEALTH DEPARTMENT

We know **health** matters

3101 Burnet Avenue
Cincinnati, Ohio 45229-3098
(513) 357-7280

Noble Maseru, Ph.D., MPH
Health Commissioner

October 26, 2010

Tiina Reponen, PhD
Professor of Environmental Health
College of Medicine
University of Cincinnati
Cincinnati, OH 45267

Dear Dr. Reponen,

I am writing to express my support for your proposed plan on studying the synergistic effects of outdoor and indoor pollution. We are interested in partnering with you as this topic is of great interest to Cincinnati Health Department.

Your data will be useful for us as we work in improving the health outcomes in the population in the greater Cincinnati area. Annually, the Cincinnati Health Department receives 800 indoor air quality complaints. There are currently no widely accepted protocols for assessing the air quality and no guidelines for interpreting the sampling data. By partnering with you, we will get first-hand access to your results, which will help us deciding the most-cost-efficient way to assess the indoor air quality in homes. Your research is also expected to help us establishing local comparison values for the key housing related health hazards and will help in planning interventions.

Additionally, we are interested in developing a grant proposal with you. As you know, we have recently started collaborating with Dr. Ryan of University of Cincinnati on studying the effects of traffic pollution in children's health at schools and are interested in expanding this collaboration to include indoor air contaminants. We plan to apply for a housing-related grant from the CDC in collaboration with you, and the pilot data that you could provide through the HUD-funded effort will be very valuable for the proposal.

I hope that this worthwhile effort will be funded and look forward to collaborating with you.

Sincerely,

Ken Sharkey
Senior Sanitarian

In Support of Rating Factors 2,3 & 4

UNIVERSITY OF Cincinnati

Department of Environmental Health
Division of Epidemiology and Biostatistics
University of Cincinnati
PO Box 670056
Cincinnati, OH 45267-0056

Delivery Address:
3223 Eden Avenue
Cincinnati, OH 45267

October 24, 2010

Tiina Reponen, Ph.D.
Department of Environmental Health
University of Cincinnati Medical Center
3223 Eden Avenue
PO Box 670056
Cincinnati, Ohio 45267-0056.

Dear Dr. Reponen,

I am pleased to know that you are submitting a grant application to HUD to study the synergistic effect of home exposure to aeroallergens and traffic-related air pollution on the development of asthma and allergic disease in children. Most of the previous asthma studies have investigated one type of exposure at a time and have not included the combined effect of indoor and outdoor air pollutants. Your proposed study is expected to give new insights that will help our understanding of allergic diseases related to environmental exposures in homes. You results will also be useful in selecting the most cost-efficient methods for assessing housing related hazards.

I am glad to learn that you are planning to use the cohort of children belonging to the Cincinnati Childhood Allergy and Air Pollution Study (CCAAPS). I believe the scientific data collected through your proposed study will be valuable for this ongoing project. With funding from HUD you will be able to take advantage of the previously collected cleaned data with very cost-effective way. Being the Principal Investigator of this project I can assure you that the data exposure and health data previously collected in the CCAAPS will be available for your proposed study. Recruitment of birth cohort and obtaining clinical, environmental data for the ages 1-7 for the children in this cohort has estimated cost of $8.7 million.

I am looking forward to collaborate with you in this very interesting project.

Sincerely,

Grace LeMasters

Grace K. LeMasters, PhD
Professor
Epidemiology and Environmental Health
Department of Environmental Health
University of Cincinnati College of Medicine

In Support of Rating Factors 2,3 & 4

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Rylander, R., Norrhall, M., Engdahl, U., Tunsater, A., Holt, P.G. (1998) Airways inflammation, atopy, and (1--> 3)-beta-D-glucan exposures in two schools. *Am. J. Respir. Crit. Care Med.* 158:1685-7.

Salo, P.M., Yin, M., Arbes, S.J., Cohn, R.D., Sever, M., Muilenberg, M., Burge, H.A., London, S.J., Zeldin D.C. (2005) Dustborne *Alternaria alternata* antigens in US homes: Results from the National Survey of Lead and Allergens in housing. *J Allergy Clin Immunol* 117:623-629.

Schram-Bijkerk, D., Doekes, G., Douwes, J., Boeve, M., Riedler, J., Ublagger, E., von Mutius, E., Benz, M.R., Pershangen, G., van Hage, M., Scheynius, A., Braun-Fahrlander, C., Waser, M., Brunekreef, B. (2005) Bacterial and fungal agents in house dust and wheeze in children: the PARSIFAL study. *Clin. Exp. Allergy* 35:1272-8.

Sporik, R., Holgate, S., Platts-Mills, T. (1990) Exposure to house dust mite allergen (Der p I) and the development of asthma in childhood. *New Engl. J. Med*., 323:502-507

Squillace, S., Sporik, R., Rakes, G. (1997) Sensitisation to dust mites as a dominant risk factor for asthma among adolescents living in Central Virginia. Multiple regression analysis of a population-based study. *Amer. J. Respir. Crit. Care Med*., 156:1760-1764

Stark, P.C., Celedon, J.C, Chew, G.L., Ryan, L.M., Burge, H.A, Muilenberg, M.L., Gold, D.R. (2005) Fungal Levels in the Home and Allergic Rhinitis by 5 Years of Age. *Environ. Health Perspect.* 113:1405-1409.

Thorn, J., Rylander, R. (1998) Airways inflammation and glucan in a row house area. *Am. J. Respir. Crit. Care Med.* 157:1798-1803.

Tovey, E.R., Chapman, M.D., Platts-Mills, T.A. (1981) Mite faeces are a major source of house dust allergens. *Nature* 289:592-593.

Vesper, S.J., McKinstry, C., Yang, C., Haugland, R.A., Kercsmar, C.M., Yike, I., Schluchter, M.D., Kirchner, H.L., Sobolewski, J., Allan, T.M., Dearborn, D.G. (2006) Specific molds associated with asthma in water-damaged homes. *J. Occup. Environ. Med.* 48:852-8.

Vesper, S.J., McKinstry, C., Haugland, R.A., Iossifova, Y., Lemasters, G., Levin, L., Khurana-Hershey, G.K., Villareal, M., Bernstein, D.I., Lockey, J., Reponen, T. (2007a) Relative moldiness index as predictor of childhood respiratory illness. *J. Expo. Sci. Environ. Epidemiol.* 17:88-94.

Vesper, S.J., McKinstry, C., Haugland, R.A., Wymer, L., Ashley, P., Cox, D., DeWalt, G., Friedman, W. (2007b) Development of an environmental relative moldiness index for homes in the U.S. *J Occup Environ Med*.; 49(8):829-33.

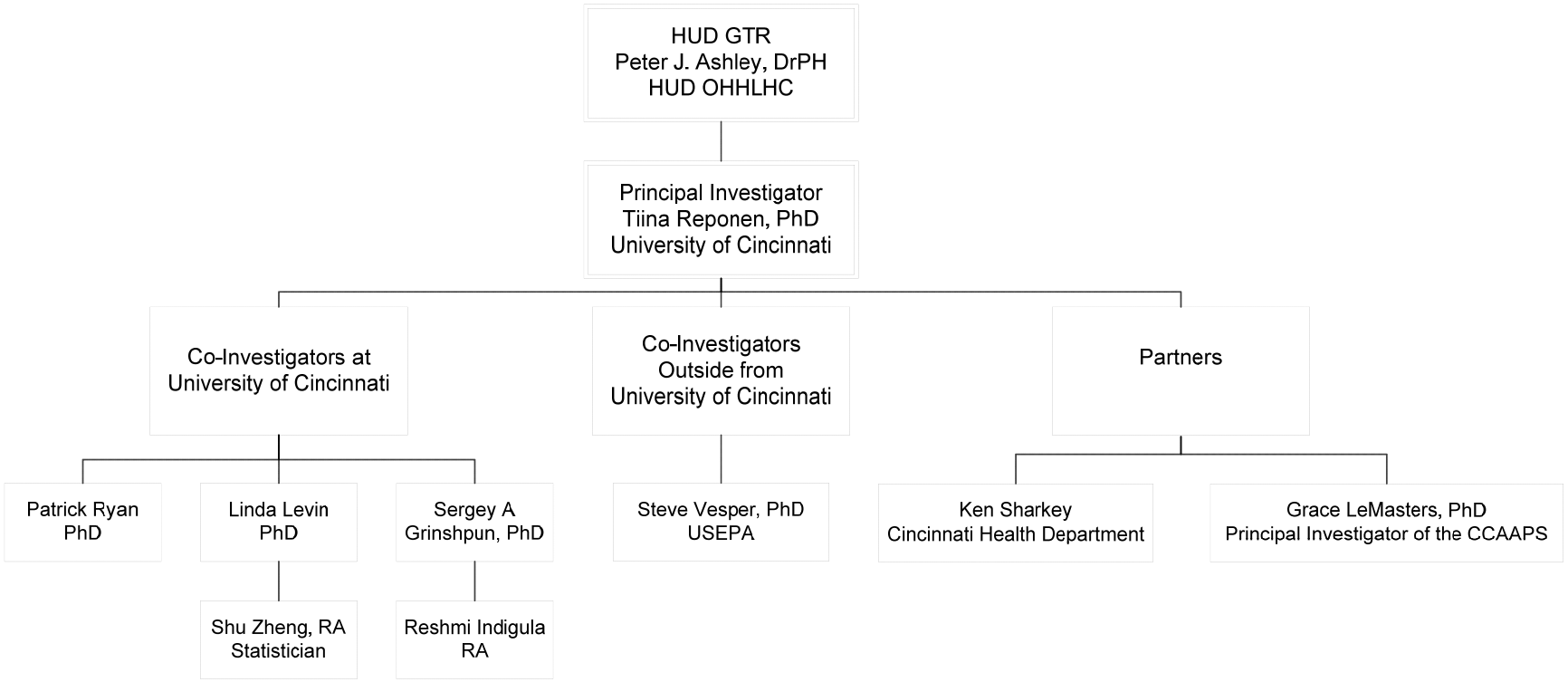
Vesper, S.J., McKinstry, C., Ashley, P., Haugland, R.A., Yeatts, K., Bradham, K., Svendsen, E. (2007c) Quantitative PCR Analysis of Molds in the Dust from Homes of Asthmatic Children in North Carolina. *J Environ Monit* 9(8):826-30

von Mutius, E., Braun-Fahrlander, C., Schierl, R., Riedler, J., Ehlermann, S., Maisch, S., Waser, M., Nowak, D. (2000) Exposure to endotoxin or other bacterial components might protect against the development of atopy. *Clin. Exp. Allergy* 30:1230-1234.

Weiss, K.B., and Sullivan, S.D. (2001) The health economics of asthma and rhinitis. I. Assessing the economic impact. *J. Allergy Clin. Immunol.* 107:3-8.

WHO Europe (World Health Organization Europe) (2009) WHO guidelines for indoor air quality: Dampness and mould. WHO: Copenhagen, Denmark.

Wickmann, M., Nordvall, S., Pershagen, G. (1993) Sensitisation to domestic mites in a cold temperate region. *Am. Rev. Respir. Dis*., 148:58-62.


HUD GTR
Peter J. Ashley, DrPH
HUD OHHLHC
Principal Investigator
Tiina Reponen, PhD
University of Cincinnati
Co-Investigators at University of Cincinnati
Co-Investigators Outside from University of Cincinnati
Partners
Patrick Ryan PhD
Linda Levin PhD
Sergey A Grinshpun, PhD
Steve Vesper, PhD USEPA
Ken Sharkey Cincinnati Health Department
Grace LeMasters, PhD Principal Investigator of the CCAAPS
Shu Zheng, RA Statistician
Reshmi Indigula RA

Appendix 1. Resumes

a. [redacted]
b. [redacted]n
c. [redacted]
d. [redacted]

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME [redacted]	POSITION TITLE Professor
eRA COMMONS USER NAME REPONETA	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of Kuopio, Kuopio, Finland	M.S.	1985	Environmental Hygiene
University of Kuopio, Kuopio, Finland	Ph.Lic.	1989	Environmental Sciences
University of Kuopio, Kuopio, Finland	Ph.D.	1994	Environmental Sciences

A. Positions and Honors.

Positions and Employment

1984-1985	Research Assistant, Department of Physics, Univ. of Helsinki, Helsinki, Finland
1985-1994	Researcher, Lecturer and Acting Senior Instructor, Department of Environmental Sciences, University of Kuopio, Kuopio, Finland
1991-1992	Acting Senior Researcher, National Public Health Institute, Kuopio, Finland
1994-1995	Research Scientist, Kuopio Regional Institute of Occupational Health, Kuopio, Finland
1995-1997	Visiting Scholar, Department of Environ. Health, Univ. of Cincinnati, Cincinnati, OH
1997-2005	Associate Professor, Department of Environ. Health, Univ. of Cincinnati, Cincinnati, OH
2003-present	Docent, Department of Environmental Sciences, University of Kuopio, Kuopio, Finland.
2005-present	Professor, Department of Environ. Health, Univ. of Cincinnati, Cincinnati, OH

Committees/Reviews

- Editor, *Aerosol Science and Technology* journal, 2010-present
- Member of the Departmental Graduate Studies Committee, Univ. Cincinnati, 2002-Pres.
- Member, Editorial Advisory Board, *Open Allergy Journal*, 2007-Pres.
- Member, AAAR Board of Directors, 2005-2008.
- Member of the Board of Trustees, UC Environmental Health Foundation, 2007-2009.
- Member, Editorial Adv. Board of the *Aerosol Science and Technology* journal, 1997-2003.
- Member, ACGIH Bioaerosols Committee, 1999-2003.
- Member, Dept. ARPT Committee, Dept of Environmental Health, Univ. Cincinnati, 2001–2003.
- Ad hoc reviewer for the following: National Science Foundation, Academy of Finland, Finland; Michael Smith Foundation for Health Research, Canada.; The Finnish Work Environment Fund, Finland; Syracuse Center of Excellence; NIOSH Intramural Projects (NPPTL); NIOSH Extramural Projects.

Major Awards

- Best poster award, AIHCE 1999, 2004, 2005, 2007, and 2010 conference
- John M. White Award for research in respiratory protection (corresponding author), AIHA, 2006 and 2010.
- John M. White Award for research in respiratory protection (co-author), AIHA, 2009.
- Swift Memorial award for an outstanding publication in the field of aerosol science and technology (co-author), AIHA, 2009.

Certifications

- Certified Indoor Air Quality Professional, 2006 (American Association for Energy Engineers).

B. Selected Peer-Reviewed Publications (selected from over 130 peer-reviewed publications)

Reponen, T.* (1995) Aerodynamic diameters and respiratory deposition estimates of viable fungal spores in mold problem homes. *Aerosol Sci. & Technol.* 22:11-23.

Rautiala, S., Reponen, T., Hyvärinen, A., Nevalainen, A., Husman, T., Vehviläinen, A. and Kalliokoski, P. (1996) Exposure to microbes during the repair of moldy buildings. *Am. Ind. Hyg. Assoc. J.* 57: 279-284.

Reponen, T., Willeke, K., Ulevicius, V., Reponen, A., and Grinshpun, S. (1996) Effect of relative humidity on aerodynamic size and respiratory deposition of fungal spores. *Atmos. Environ.* 30:3967-3974.

Reponen, T.*, Willeke, K., Ulevicius, V., Grinshpun, S.A., and Donnelly, J. (1997) Techniques for dispersion of microorganisms into air. *Aerosol Sci. Technol.* 27:405-421.
Reponen, T.A.*, Gazenko, S.V., Grinshpun, S.A., Willeke, K., and Cole, E.C. (1998) Characteristics of airborne actinomycete spores. *Appl. Environ. Microbiol.* 64:3807-3812.
Reponen, T.*, Wang, Z., Willeke, K., and Grinshpun, S. (1999) Survival of Mtb simulant bacterium on respirator filters. *Infect. Control Hospital Epidemiol.* 20:237-241.
Reponen T.*, Grinshpun, S.A., Conwell, K.L., Wiest, J. Anderson, M. (2001) Aerodynamic versus physical size of spores: measurement and implication on respiratory deposition. *Grana* 40:119-125.
Toivola, M., Alm, S., Reponen, T., Kolari, S., Nevalainen, A. (2002) Personal exposures and microenvironmental concentrations of particles and bioaerosols. *J. Environ. Monitoring* 4:166-174.
Górny, R.L., Reponen, T.*, Willeke, K., Robine, E., Boissier, M., Grinshpun, S.A. (2002) Fungal fragments as indoor biocontaminants. *Appl. Environ. Microbiol.* 68:3522-3531.
Adhikari, A., Martuzevicius, D., Reponen, T.*, Grinshpun, S.A., Cho, S.-H., Sivasubramani, S. K., Zhong, W., Levin, L., Kelley, A.L., St. Clair, H., LeMasters, G. (2003) Performance of the Button Personal Inhalable Sampler for the measurement of outdoor aeroallergens. *Atmos. Environ.* 34:4723-4733.
Meklin, T., Haugland, R.S., Reponen, T., Varma, M., Lummus, Z., Bernstein, D., Wymer, L., Vesper, S. (2004) Quantitative PCR analysis of house dust can reveal abnormal mold conditions. *J. Environ. Monit.* 6:615-620.
Campo, P., Kalra, H.K., Levin, L., Reponen, T., Olds, R., Lummus, Z.L., Cho, S.-H., Hershey, G.K., Lockey, J., Villarreal, M., Stanforth, S., LeMasters, G., Bernstein, D.I. (2006) Influence of dog ownership and high endotoxin on wheezing and atopy during infancy. *J. Allergy & Clin. Immunol.* 118:1271-1278.
Chew, G.L., Wilson, J., Rabito, F.A., Grimsley, F., Iqbal, S., Reponen, T., Muilenberg, M.L., Thorne, P.S., Dearborn, D.G., Morley, R.L. (2006) Mold and endotoxin levels in the aftermath of hurricane Katrina: a pilot project of homes in New Orleans undergoing renovation. *Environ. Health Perspect.* 114:1883-1889.
Vesper, S.J., McKinstry, C., Haugland, R.A., Iossifova, Y., LeMasters, G., Levin, L., Khurana Hershey, G.J., Villareal, M., Bernstein, D.I., Lockey, J., Reponen, T. (2007) EPA relative moldiness index© as predictor of childhood respiratory illness. *J. Exp. Sci. & Environ. Epidemiol.* 17:88-94.
Meklin, T., McKinstry, C., Reponen, T., Cho, S.-H., Grinshpun, S., Nevalainen, A., Vepsäläinen, A., Haugland, R., LeMasters, G., Vesper, S.J. (2007) Comparison of mold concentrations in dust, indoor and outdoor air sampled simultaneously and then quantified by MSQPCR. *Sci. Total Environ.* 382:130-134.
Reponen, T.*, Seo, S.-C., Grimsley, F., Lee, T., Crawford, C., Grinshpun, S.A. (2007) Fungal fragments in moldy houses: a field study in homes in New Orleans and Southern Ohio. *Atmos. Environ.* 41: 8140-8149.
Iossifova, Y., Reponen, T.*, Bernstein, D., Levin, L., Zeigler, H., Kalra, H. Campo, P., Villareal, M., Lockey, J., Khurana Hershey, G.K., LeMasters, G. (2007) House dust (1-3)-β-d-glucan and wheezing in infants. *Allergy* 62:504-513.
Iossifova, Y., Sucharew, H., Succop, P., Vesper, S., Reponen, T.,* (2008) Use of (1-3)-β-D-glucan concentrations in dust as a surrogate method for estimating specific mold exposures. *Indoor Air* 18:225-232.
Seo, S.-C., Reponen, T.*, Levin, L., Borchelt, T., Grinshpun, S.A. (2008) Aerosolization of particulate (1→3)-β-D-glucan from moldy materials. *Appl. & Environ. Microbiol.* 74:585-593.
Peccia, J., Milton, D., Reponen, T., Hill, J. (2008) Environmental engineering and science in preventing airborne biological disease. *Environ. Sci.& Technol.* 42:4631-4637.
Seo S.-C., Reponen, T.,* Grinshpun, S.A. (2008) Size-fractionated (1→3)-β-D-glucan concentrations released from different moldy materials. *Sci. Total Environ.* 407:806-814.
Iossifova Y.Y., Reponen T.,* Ryan, P.H., Levin L., Bernstein, D.I., Lockey J.E., Gurjit K. Khurana Hershey,G.K., Villareal, M., LeMasters, G. (2009) Mold exposure during infancy as a strong predictor of potential asthma development. *Ann. Allergy, Asthma & Immunol.* 102:131-137.
Adhikari, A., Jung, J., Reponen, T., Lewis, J.S., DeGrasse, E.J., Grimsley, F., Chew, G.L., Grinshpun, S.A. (2009) Aerosolization of fungi, (1→3)-β-D glucan, and endotoxin from flood-affected materials collected in new Orleans homes. *Environ. Res.* 109:215-224.
Adhikari, A., Lewis, J.S., Reponen, T., DeGrasse, E.C., Grimsley, L.F., Chew, G.L., Iossifova, Y., Grinshpun, S.A. (2010) Exposure matrices of endotoxin, (1→3)-β-D-glucan, fungi, and dust mite allergens in flood-affected homes of New Orleans. *Sci. Total Environ.* 15:5489-5498.
Reponen, T.,* Singh, U., Schaffer, C., Vesper, S., Johansson, E., Adhikari, A., Grinshpun, S.A., Indugula, R., Ryan, P., Levin, L., LeMasters, G. (2010) Visually observed mold and moldy odor versus quantitatively measured microbial exposure in homes. *Sci. Total Environ.* 15:5565-5574.

* corresponding author

C. Research Support
Ongoing Research Support

NIOSH T42OH008432 (IH) (Rice) 07/01/05-06/30/11
Education and Research Center
To provide multidisciplinary programs for professional and scientific training in the major fields of Occupational Safety and Health and related disciplines. This support reflects Dr. Reponen's teaching activities.
Role: Deputy Director

NIOSH R01OH04085 (Reponen) 08/01/07-07/31/11(NCE)
Respiratory Protection against Bioaerosols in Agriculture
The major goal of this study is to assess the range of workplace protection factors for N-95 filtering facepiece and half-facepiece elastomeric respirators against particles and bioaerosols in agricultural environments and to assess the contribution of particle characteristics on the protection factors.
Role: P.I.

NIEHS R01ES016531 (Haynes) 04/01/08-02/28/13
Marietta Community Actively Researching Exposure Study
The primary objective of this study is to examine biological indicators of manganese exposure and to understand the effects of chronic manganese exposures in children.
Role: Co-investigator

US Department of Defense (DTRA) (Grinshpun) 02/08/08-02/07/11
Inactivation of Aerosolized Biological Agents using Filled Nanocomposite Materials
The major goal of this study is to evaluate and test novel filled nanocomposite materials for inactivating stress-resistant airborne microorganisms.
Role: Co-investigator

NIH/NIEHS 1R21ES017957 (Ryan, PI) 10/01/09-09/30/2011
Impact of Traffic-Related Particles on Asthma for Students in an Urban School District
This partnership between the University of Cincinnati, Cincinnati Health Department, and the Cincinnati Public Schools will build upon the strengths of each organization to collaboratively determine if children are exposed to increased levels of traffic-related PM at school compared to ambient levels in the communities where the children reside.

HUD OHLHH0199-09 (Adhikari) 05/15/10-10/31/2012
Bacteria and bacterial immunomodulators in moisture damaged versus reference homes
The purpose of this study is to investigate the prevalence and respiratory deposition levels of key housing-related bacterial biocontaminants in moisture damaged and reference homes using Environmental Relative Moldiness Index as the primary metric for moisture damage.

Completed:
HUD OHLHH0162-07 (Reponen) 11/15/07-11/04/10
Mold Exposure in Homes & the Development of Children's Atopy & Asthma
The major goal of this study is to identify a method that is most predictive for the adverse health effects caused by residential mold exposure, especially the development of asthma and allergic rhinitis.
Role: P.I.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME [redacted]	POSITION TITLE Professor
eRA COMMONS USER NAME GRINSHS	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Odessa University, Odessa, Ukraine	M.S.	1982	Physics
Odessa University, Odessa, Ukraine	Ph.D.	1987	Thermophysics (Aerosol Science)

A. Positions and Honors

PROFESSIONAL EXPERIENCE

ODESSA UNIVERSITY, ODESSA, UKRAINE, USSR

1982-1987 Junior Research Fellow, Physics of Aerodispersed Systems Laboratory (PASL)
1987-1989 Research Scientist and Project Principal Investigator, PASL
1982-1991 Lecturer, Undergraduate and Graduate Study Programs, Physics Department
1989-1991 Head of Research Group, PASL

UNIVERSITY OF CINCINNATI COLLEGE OF MEDICINE, CINCINNATI, OH, USA

1991-1993 Visiting Faculty Member, Department of Environmental Health
1993-2003 Associate Professor, Department of Environmental Health
2000- pres Director, Center for Health-Related Aerosol Studies
2003- pres Professor of Environmental Health

MAJOR AWARDS

1994 Biomedical Engineering Award, University of Cincinnati, Cincinnati, OH
1996 Smoluchowski Award -- annual international award in aerosol science, European Aerosol Conference, Delft, THE NETHERLANDS
1997 John White Award for research in respiratory protection, AIHA, Dallas, TX
1997 Outstanding Aerosol Paper Award, AIHA, Dallas, TX
1998 John White Award for research in respiratory protection, AIHA, Atlanta, GA
1999 Certificate of Excellence, Best Poster Award, AIHA, Toronto, CANADA
2000 Best Practice Award by the US Department of HUD (applied research category), Washington, DC
2001 David Swift Memorial Award for Outstanding Aerosol Paper published in 2000, AIHA, New Orleans, LA
2006 John White Award for research in respiratory protection, AIHA, Chicago, IL
2009 John White Award for research in respiratory protection, AIHA, Toronto, CANADA
2009 David Swift Memorial Award for Outstanding Aerosol Paper published in 2008, AIHA, Toronto, CANADA
2010 John White Award for research in respiratory protection, AIHA, Denver, CO

SERVICE IN EDITORIAL BOARDS AND PEER-REVIEW FOR SCIENTIFIC JOURNALS

EDITORIAL BOARDS: *Aerobiologia (2006-present), Aerosol & Air Quality Res. (2003-present), Amer. Industr. Hyg. Assoc. J. (2000-2003), Environ. & Chem. Phys. (1999-present), J. Aerosol Sci. (2002-present), J. Korean Soc. Occup. & Environ. Hyg. (2007-present), Recent Patents in Engineer. (2006-present).*

PEER-REVIEW: *Aerobiologia, Aerosol & Air Quality Res., Aerosol Sci. & Technol., AIHA J., Amer. J. Infect. Contr., Appl. Environ. Microbiol., Atmos. Environ., Building & Environ., Environ. Health Persp.*, *Environ. Res., Environ. Sci. & Technol., Geophy. Res. Let., Indoor Air, Int. J. Environ. Technol. Managm., J. Aerosol Sci., J. Air & Waste Manag. Assoc., JAMA, J. ASTM Int., J. Colloid Interface Sci., J. Environ. Monitoring, Exp. Analysis & Environ. Epidemiol., J. Heat. Vent.& Air Condit., J. Tox. & Environ. Health, Meteorology & Hydrology, Phys. Aerodispersed Syst., Science, Separation Sci. & Technol., Sci. Total Environ.*

B. Selected peer-reviewed publications (from the list of 490 publications)

Grinshpun, S.A., Lipatov, G.N., Semenyuk, T.I. and Yakimchuk, V.I. (1991) Peculiarities of Lycopodium Spores Sampling from the Ambient Atmosphere: Physical Effects and Problems of Representativeness, *Grana,* 30(2):424-429.

Grinshpun, S.A., Willeke, K. and Kalatoor, S. (1993) General Equation for Aerosol Aspiration by Thin-Walled Sampling Probes from Calm and Moving Air, *Atmos. Environ.*, 27A(9):1459-1470; and 28A(2):375.

Grinshpun, S.A., Chang, C.W., Nevalainen, A. and Willeke, K. (1994) Inlet Characteristics of Bioaerosol Samplers, *J. Aerosol Sci.*, 25(8):1503-1522.

Stewart, S., Grinshpun, S.A., Willeke, K., Terzieva, S., Ulevicius, V. and Donnelly, J. (1995) Effect of Impact Stress on Microbial Recovery on an Agar Surface, *Appl. & Environ. Microbiol.*, 61(4):1232-1239.

Grinshpun, S.A., Willeke, K., Ulevicius, V., Juozaitis, A., Terzieva, S. Donnelly, J., Stelma, G.N. and Brenner, K. (1997) Effect of Impaction, Bounce and Reaerosolization on Collection Efficiency of Impingers, *Aerosol Sci. & Technol.*, 26(4):326-342.

Reponen, T., Wang, Z., Willeke, K., and Grinshpun, S.A. (1999) Survival of *Mycobacteria* on N95 Personal Respirators, *Infection Control & Hospital Epidemiol.*, 20(4):237-241.

Grinshpun, S.A., Redcoborody, Y.N., Kravchuk, S.G., Zadorozhnii, V.I. and Zhdanov, V.I. (2000) Particle Drift in the Field of Internal Gravity Wave, *Int. J. Multiphase Flow*, 26:1305-1324.

Reponen, T., Grinshpun, S.A., Conwell, K.L., Wiest, J., and Anderson, M. (2001) Aerodynamic Versus Physical Size of Spores: Measurement and Implication on Respiratory Deposition, *Grana*, 40:119-125.

Grinshpun, S.A., Choe, K.T., Trunov, M., Willeke, K., Menrath, W., and Friedman, W. (2002) Efficiency of Final Cleaning for Lead-Based Paint Abatement in Indoor Environments, *Appl. Occup. & Environ. Hyg.*, 17(3):222-234.

Martuzevisius, D., Grinshpun, S.A., Reponen, T., Górny, R.L., Shukla, R., Lockey, J.E.,Hu, S., McDonald, R., Biswas, P., Kliucininkas, L., and LeMasters, G., (2003) Spatial and Temporal Variation of PM2.5 Concentration Throughout an Urban Area with High Freeway Density, *Atmos. Environ.*, 38:1091-1105.

Lee, B.U., Yermakov, M., and Grinshpun, S.A. (2004) Removal of Fine and Ultrafine Particles from Indoor Air Environments by the Unipolar Ion Emission, *Atmos. Environ.*, 38:4815-4823.

Grinshpun, S.A., Adhikari, A., Lee, B.U., Trunov, M., Mainelis, G., Yermakov, M., and Reponen, T. (2004) Indoor Air Pollution Control Through Ionization, IN: *Air Pollution: Modeling, Monitoring and Management of Air Pollution* (Ed: C.A. Brebbia), WIT Press, Southampton, U.K.:689-704.

Sivasubramani, S.K., Niemeier, R.T., Reponen, T., and Grinshpun, S.A. (2004) Assessment of the Aerosolization Potential for Fungal Spores in Moldy Homes, *Indoor Air*, 14:405-412.

Grinshpun, S.A. and Clark, J.M. (2005) Guest Editorial - Measurement and Characterization of Bioaerosols, *J. Aerosol Sci.*, 36(5):553-555.

Grinshpun, S.A., Mainelis, G., Trunov, Adhikari, A., Reponen, T., and Willeke, K. (2005) Evaluation of Ionic Air Purifiers for Reducing Aerosol Exposure in Confined Indoor Spaces, *Indoor Air*, 15:235-245.

Lee, T., Grinshpun, S.A., Martuzevicius, D., Adhikari, A., Crawford, C.M., Luo, J., and Reponen, T., (2006) Relationship Between Indoor and Outdoor Bioaerosols Collected with a Button Inhalable Aerosol Sampler in Urban Homes, *Indoor Air,* 16:37-47.

Balazy, A., Toivola, M., Adhikari, A., Sivasubramani, S.K., Reponen, T., and Grinshpun, S.A. (2006) Do N95 Respirators Provide 95% Protection Level Against Airborne Viruses and How Adequate are Surgical Masks? *Amer. J. Infection Control*, 34(2):51-57.

Burton, N.C., Grinshpun, S.A., and Reponen, T. (2007) Physical Collection Efficiency of Filter Materials for Bacteria and Viruses, *Ann. Occup. Hyg.*, 51:143-151.

Grinshpun, S.A., Adhikari, A., Honda, T., Kim, K-Y., Toivola, M., Rao, K.S.R., and Reponen, T. (2007) Control of Aerosol Contaminants in Indoor Air: Combining the Particle Concentration Reduction with Microbial Inactivation, *Environ. Sci. & Technol.,* 41(2):606-612.

Grinshpun, S.A., Adhikari, A., Li C., Reponen, T., Yermakov, M., Schoenitz, M., Dreizin, E., Trunov M., and Mohan, S. (2010) Thermal Inactivation of Airborne Viable *Bacillus Subtilis* Spores by Short-Term Exposure in Axially Heated Air Flow, *J. Aerosol Sci.* 41, 352-363.

Grinshpun, S.A., Li C., Adhikari, A., Yermakov, M., Reponen, T., Schoenitz, M., Dreizin, E., Hoffmann, V., and Trunov M. (2010) Method For Studying Survival Of Airborne Viable Microorganisms in Combustion Environments: Development And Evaluation, *Aerosol & Air Quality Res.*, 10(5), 414-424.

Grinshpun, S.A., Adhikari, A., Li, C., Yermakov, M., Reponen, L., Johansson, E., Trunov, M. (2010) Thermal Inactivation of Aerosolized Viruses in Continuous Air Flow With Axial Heating. *Aerosol Sci. & Technol*., in press.

Johansson, E., Adhikari, A., Reponen, T., Yermakov, M., and Grinshpun, S.A. (2010) Association Between Increased DNA Mutational Frequency And Thermal Inactivation of Aerosolized *Bacillus* Spores Exposed to Dry Heat, *Aerosol Sci. & Technol.*, submitted.

C. Research Support (selected)

Ongoing:

US Department of Defense (DTRA) HDTRA-1-08-1-0012 (Grinshpun - PI), 02/08/08-02/07/11
Inactivation of Aerosolized Biological Agents using Filled Nanocomposite Materials
The major goal of this study is to evaluate and test novel filled nanocomposite materials for inactivating stress-resistant airborne microorganisms. Role: PI

NIEHS R01 ES11170 (LeMasters - PI), 07/01/05-06/30/11
Diesel, Allergens and Gene Interaction and Child Atopy
The central purpose of this study is to determine if infants who are exposed to DEP via truck exhaust are at an increased risk for atopy and atopic respiratory disorders and to determine if this effect is magnified in a genetically at risk population. Role: Co-I

NIOSH T42OH008432 (Rice - PI), 07/01/05-06/30/11
Education and Research Center
To provide multidisciplinary programs for professional and scientific training in the major fields of Occupational Safety and Health and related disciplines. Role: Co-I

NIOSH R01OH004085 (Reponen - PI), 08/01/07-07/31/11 (NCE)
Respiratory Protection against Bioaerosols in Agriculture
The major goal of this study is to assess the range of workplace protection factors for N-95 filtering facepiece and half-facepiece elastomeric respirators against particles and bioaerosols in agricultural environments and to assess the contribution of particle characteristics on the protection factors. Role: Co-I

NIEHS R21ES017957 (Ryan - PI), 10/1/09-09/30/11
Impact of Traffic-Related Particles on Asthma for Students in an Urban School District
The goal of this study is determine if children are exposed to increased levels of traffic-related particles at school compared to ambient levels in the surrounding communities. In addition, a community-driven anti-idling campaign will be developed and implemented and the effectiveness will be evaluated by assessing the reduction of exposure at schools and the impact on the health of children with asthma. Role: Co-I

HUD OHLHH (Adhikari - PI), 05/15/10-10/31/12
Bacteria and Bacterial Immunomodulators in Moisture Damaged versus Reference Homes
The purpose of this study is to investigate the prevalence and respiratory deposition levels of key housing-related bacterial biocontaminants (Gram-positive and Gram-negative bacteria, *Streptomyces*, and bacterial immunomodulators including endotoxin, peptidoglycan, and total bacterial DNA) in moisture damaged and reference homes using Environmental Relative Moldiness Index as the primary metric for moisture damage Role: Co-I.

Completed (most recently):

HUD OHLHH0162-07 (Reponen - PI), 11/15/07-11/04/10
Mold Exposure in Homes & the Development of Children's Atopy & Asthma
The major goal of this study is to identify a method that is most predictive for the adverse health effects caused by residential mold exposure, especially the development of asthma and allergic rhinitis. Role: Co-I

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Follow the sample format on preceding page for each person. **DO NOT EXCEED FOUR PAGES.**

NAME [redacted]	POSITION TITLE Research Associate Professor

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	MM/YY	FIELD OF STUDY
Bryn Mawr College, Bryn Mawr, Pennsylvania	BA	06/59	Mathematics, Cum Laude with Honors
Tulane University, New Orleans, Louisiana	MS	06/65	Biostatistics, NIH Fellowship
Mt. St. Joseph College, Cincinnati, Ohio	BA	06/92	Gerontological Studies
University of Cincinnati, Cincinnati, Ohio	PhD	08/96	Biostatistics

A. Positions and Honors

Positions and Employment

1968-69 Tulane University School of Tropical Medicine and Public Health. Department of Epidemiology and Parasitology, Research statistician.

1969-80 University of Cincinnati, College of Medicine, Department of Environmental Health. Research Associate part-time.

1975-82 Joseph M. Levin, MD, Inc. Business and administrative manager.

1982-84 University of Cincinnati College of Arts and Sciences, Department of Mathematics. Instructor in mathematics, statistics, and computer science.

1983-94 University of Cincinnati College of Evening and Continuing Education. Part-time instructor in mathematics.

1989-97 University of Cincinnati College of Medicine, Department of Environmental Health, Research Associate.

1998-99 University of Cincinnati College of Medicine, Department of Environmental Health, Research Assistant Professor.

1999-2007 University of Cincinnati College of Medicine, Department of Environmental Health. Research Assistant Professor. University of Cincinnati, Center for Biostatistical Services, Chief Consultant

2007- present University of Cincinnati College of Medicine, Department of Environmental Health, Research Associate Professor. University of Cincinnati, College of Medicine, Center for Biostatistical Services, Chief Consultant.

Other Experiences and Professional Memberships

1988-present Member, American Statistical Association

2009- present Ongoing statistical reviewer Journal of Allergy and Immunology

2008- present Ongoing statistical reviewer Journal of American Heart Association

July 2010 Member of Peer Review Committee for funding opportunity: Exploring New Air Pollution-Health Effects in Existing Datasets, EPA-G2010-STAR-B1

Honors

1959 Cum Laude with honors in Mathematics, Bryn Mawr College, Bryn Mawr, PA.

1961-65 NIH fellowship - Tulane University, New Orleans, LA.

2002 American Association of Medical Acupuncture, Second Place 2002 Acupuncture Research Award. Scheer, S., Lee, L., Stemple, J.C., Daughton, S., Weinrich, B., Miller, T., Goeller, S., and Levin, L. Use of acupuncture for treatment of spasmodic dysphonia.

B. Selected Peer-reviewed Publications (out of 92)

1. Epstein T, Bernstein DI, Levin L, Hershey GKK, Ryan P, Reponen T, Villareal, Lockey JE, LeMasters GK. Opposing Effects if Cat and Dog Ownership and Allergic Sensitization on Eczema in an Atopic Birth Cohort. J Peds. Accepted July 2010.

2. Page S, Dunning K ***, Levin L.*** Longer versus Shorter Daily Durations of Electrical Stimulation During

Task Specific Practice in Moderately Impaired Stroke. Neurorehabilitation and Neural Repair. Accepted July 2010.

3. McKay RTM, Lemasters G, Hilbert TJ, **Levin L,** Rice CH, Borton, EK, Lockey JE. A Long Term Study of Pulmonary Function Among US Refractory Ceramic Fiber Workers. Occupational and Environmental Medicine. EPub Jan 6, 2010.
4. Czyzyk-Krzeska MF, Mikhaylova O, Bastola PT, Meller J, **Levin L.** VHL-dependent patterns of RNA polymerase II hydroxylation in human renal cell carcinoma. Clin Can Res. Accepted Jul 2010.
5. Ouyang B, Bracken B, **Levin L,** Cheng L, Chung E, Wang V, Leung RYK, Ho, SM. Alpha-Methylacyl-CoA Racemase Spliced Variants and Their Expression in Normal and Malignant Prostate Tissues. Urology. Accepted Aug 2010.
6. Lu S, Zhongyun D, Liu Y, Scott KF, **Levin L,** Gaitonde K. Bracken B, Burke B, Zhail Q, Wang J, Oleksowicz L. Secrotory Phospholipase A2-IIa is Involved in Prostate Cancer Progression and May Potentially Serve As a Biomarker for Prostate Cancer. Carcinogenesis. Accepted Sep 2010.
7. Djawe K, Daly KR, Vargas SL, Santolaya ME, Ponce CA, Bustamante R, Koch J, **Levin L,** Walzer PD. Seroepidemiological study of *pneumocystis jirovecii* infection in healthy infants in Chile using recombinant fragments of the *p. jirovecii* major surface glycoprotein. Int J Infect Dis (2010).
8. Reponen T, Singh U, Schaffer C Vesper S, Johanssen E, Adhikari A, Grinsphun SA, Indugula R, Ryan P, **Levin L,** Lemasters G. Visually observed mold and moldy odor versus quantitatively measured microbial exposure in homes. Sci T Env 408 (2010) 5565-5574.
9. Ryan PH, Bernstein DI, Lockey J, Reponen T, **Levin L,** Grinshpun S. Villareal M, Hershey GK, LeMasters GK. Exposure to Traffic-related Particles and Endotoxin During Infancy Are Associated with Wheezing at Age 3 Years. Am J Respir Crit Care Med Vol 180. pp1068-1075, 2009.
10. Lockey JE, Hilbert TJ, **Levin LS**, Ryan PH, White KL, Borton EK, Rice CH, McKay RT, LeMasters GK. Airway obstruction related to diacetyl exposure at microwave popcorn production facilities Eur Respir J July 2009 34: 63-71.
11. Walzer P, Djawe K, **Levin L,** Daly KR, Koch J, Kingsley L, Witt M, Golub ET, Bream JH, Taiwo B, Morris A. Long-term Serologic Responses to the Pneumocystis jirovecii Major Surface Glycoprotein in Human Immunodeficiency Virus Subjects With and Without P jirovecii Infection. J Infectious Dis 2009: 199 (1 May).
12. Perera F, Tang W-Y, Herbstman J, Tang D, **Levin L,** Miller R, Ho S-m. Relation of DNA Methylation of 5'-CpG Island of ACSL3 to Transplacental Exposure to Airborne Polycyclic Aromatic Hydrocarbons and Childhood Asthma *PLoS ONE 4(2):* e4488. February, 2009.
13. Couch SC, Saelens BE, **Levin L,** Dart K, Falciglia G, Daniels SR. The efficacy of a clinic-based behavioral nutrition intervention emphasizing a DASH-type diet for adolescents with elevated blood pressure. J Pediatr, 2008 Apr; 152(4):494-501.
14. Brandt DM, **Levin L,** Matsui E, Phipatanakul W, Smith AM, Bernstein JA.. Allergists' Attitudes Toward Environmental Control: Insights Into its Current Application in Clinical Practice. J Allergy Clin Immunol. 2008 April:121(4):1053-1054.
15. Campo P, Kalra HK, **Levin L**, Reponen T, Olds R, Lummus ZI, Cho SH, Hershey GK, Lockey J, Villareal, Stanforth S, LeMasters G, Bernstein DI. Influence of Dog Ownership and High Endotoxin on Wheezing and Atopy During Infancy. J Allergy Clin Immunol. 2006 Dec;118(6):1271-8.
16. Daly KR, Koch JV, Shire N, **Levin L,** Walzer PD. Human Immunodefiency Virus infected patients with prior Pneumocystis pneumonia exhibit increased serologic reactivity to several major surface glycoprotein clones. *JClicVacIm.* Oct 2006: 071-1078.
17. LeMasters GK, Wilson K, **Levin L,** Biagini J, Ryan PH, Lockey JE, Stanforth S, Maier S, Yang J, Burkle J, Villareal M, Hershey GKK, Bernstein DI. High Prevalence of Aeroallergen Senstitization Among Infants of Atopic Parents. *J Pediatr* 2006: 149: 505-11.
18. Zhong W, **Levin L**, Reponen T, Hershey GK, Adhikari A, Shukla R, LeMasters G. Analysis of Short-term influences of Ambient Aeroallergens on Pediatric Asthma Hospital Visits. *SciTot Env:* 370 (2006):330-336.
19. Silberstein EB, **Levin L,** Fernandez-Ulloa M, Gass M, Hughes, Bone Mineral Density (BMD) Assessment of Central Skeletal Sites from Peripheral BMD and Ultrasonographic Measurements: An Improved Solution Employing Age and Weight in Type Three Regressions. *J.Clin Densitometry*. Vol 9, No 3. 323-328, Aug, 2006.
20. Rice CR, **Levin LS,** Borton E, Lockey JE, Hilbert T, LeMasters GK. Exposures to Refractory Ceramic Fibers in Manufacturing and Related Operations: a 10-year Update. J. Occup Environl Hyg, 2 :462-473, Sept 2005.
21. Lockey, J.E., Lemasters, G.K., **Levin, L**., Rice, C., Yiin, J., Reutman, S., and Papes, D. Longitudinal study of chest radiographic changes of workers in the refractory ceramic fiber industry. Chest, 121:2044-2051, 2002.

22**. Levin L,** Rice C, Lockey JE, Lemasters GK, and Medvedovic M. What is the potential measurement error in occupational exposure studies. Journal of the Air and Waste Management Association, 50:941-947, 2000.
23. BOOK CHAPTER: Tepper LB and **Levin LS**: A survey of air and population lead levels in selected American communities. In Griffin, TB and Knelson JH. Guest Editors: "Lead." Environmental Quality and Safety Supplement Volume II. Stuttgart, Georg Thieme; New York, Academic Press, 1976, pp. 152-196.

C. Research Support

Ongoing research Support

NIH R01 ES011170-08 (LeMasters, PI) 07/01/2007 - 06/30/2011
Diesel, Allergens and Gene Interaction and Child Atopy
To determine in infants who are exposed to diesel exhaust particles via truck exhaust in co-exposure with aeroallergy are at an increased risk for atopy and atopic respiratory disorders and to determine if this effect magnified in a genetically at risk population.

Refractory Ceramic Fiber Coalition (Lockey, PI) 07/01/2005 - 06/30/2011
Pulmonary Surveillance of RCF Manufacturing Facilities
An epidemiological study assessing respiratory effects of workers exposed to ceramic fibers.

R15 HD055598-01A2 (Falciglia, PI) 08/01/2008 - 07/31/2011
Preventing Childhood Obesity: Targeting the Diet of the Mother and Child Dyad
The objective of this proposal is to evaluate the effectiveness of a dietary intervention on increasing vegetable intake in postpartum, overweight mothers and their children.

DTRT57-09-D-30009 Tasks 1 and 2 (Lockey, PI) 02/01/2009 - 10/01/2012
USDOT via Volpe National Transportation System Center
Expert Support for Derivation of an Asbestos Reference Concentration and Supply Updated Health and Exposure Data for the Libby Superfund Site

R01 HL088567-02 (Couch, PI) 02/01/2008 - 01/31/2013
Modifying Dietary Behavior in Adolescents with Elevated Blood Pressure
The primary objectives of this study are two-fold: 1) to determine the impact of the intervention on dietary intake, BP, hypertension status, and vascular function immediately post-treatment and at 1 year follow-up, and 2) to examine the relationship between intervention adherence and diet, BP and vascular outcomes.

Completed:

HUD OHLHH0162-07 (Reponen, PI) 11/15/2007 - 11/04/2010
Mold Exposure in Homes & the Development of Children's Atopy & Asthma
The major goal of this study is to identify a method that is most predictive for the adverse health effects caused by residential mold exposure, especially the development of asthma and allergic rhinitis.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME [redacted]	POSITION TITLE Research Assistant Professor
eRA COMMONS USER NAME (credential, e.g., agency login) RYANPH	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Xavier University	B.S.U.	2001	Mathematics
University of Cincinnati	M.S.	2004	Epidemiology
University of Cincinnati	Ph.D.	2007	Epidemiology

A. Positions

2002 - 2005	Fellow,Molecular Epidemiology in Children's Environmental Health Training Grant
2005 - 2007	Research Associate, Department of Environmental Health, University of Cincinnati
2008 - Present	Research Assistant Professor, Department of Environmental Health, Division of Epidemiology and Biostatistics, University of Cincinnati

B. Selected Peer-reviewed Publications

1. **Ryan PH**, LeMasters G, Biagini J, Bernstein D, Grinshpun SA, Shukla R, Wilson K, Villareal M, Burkle J, Lockey J. Is it traffic type, volume, or distance? Wheezing in infants living near truck and bus traffic. *Journal of Allergy and Clinical Immunology*. 2005;116:279-284

2. Biagini JM, LeMasters GK, **Ryan PH**, Levin L, Reponen T, Bernstein DI, Villareal M, Hershey GKK, Burkle J, Lockey J. Environmental risk factors of rhinitis in early infancy. *Pediatric Allergy and Immunology*. 2006 June; 17(4): 278-284.

3.LeMasters GK, Wilson K, Levin L, Biagini J, **Ryan P**, Lockey JE, Stanforth S, Maier S, Yang J, Burkle J, Villareal M, Hershey GK, Bernstein D. High prevalence of aeroallergen sensitization among infants of atopic parents *The Journal of Pediatrics*. 2006;149:505-511.

4. Cho S, Reponen T, LeMasters G, Levin L, Huang J, Meklin T, **Ryan P**, Villareal M, Bernstein D. Mold damage in homes and wheezing in infants. *Annals of Allergy Asthma and Immunology.* 2006;97:539-545.

5. **Ryan PH**, LeMasters GK, Biswas P, Levin L, Hu S, Lindsey M, Bernstein DI, Lockey J, Villareal M, Hershey GKK, Grinshpun SA. A comparison of proximity and land use regression traffic exposure models and wheezing in infants. *Environmental Health Perspectives*. 2007;115(2):278-284.

6. **Ryan PH** and LeMasters GK. A review of land-use regression models for characterizing intraurban air pollution exposure. *Inhalation Toxicology*. 2007;19(Suppl 1):127-133.

7. Appatova AS, **Ryan PH**, LeMasters GK, Grinshpun SA. Proximal Exposure of Public Schools and Students to Major Roadways: A Nationwide US Survey. *Journal of Environmental Planning and Management*. 2008; 51(5):631-646.

8. **Ryan PH**, LeMasters GK, Levin L, Burkle J, Biswas P, Hu S, Grinshpun S, Reponen T. A Land-Use Regression Model for Estimating Microenvironmental Diesel Exposure Given Multiple Addresses From Birth Through Childhood. *Science of the Total Environment*. 2008;404:139-147.

9. Iossifova YY, Reponen T, **Ryan PH**, Levin L, Bernstein DI, Lockey JE, Hershey GKK, Villareal M, LeMasters G. Mold Exposure During Infancy As a Strong Predictor of Potential Asthma Development. *Annals of Allergy, Asthma, and Immunology*. 2009;102:131-137.

10. Schroer KT, Biagini JM, **Ryan PH**, LeMasters GK, Bernstein DI, Villareal M, et al. Interactions Between Environmental Exposures and Glutathione S-transferase P1 on Persistent Wheezing in a Birth Cohort. *Journal of Pediatrics*. 2009;154:401-8.

11. Li C, Nguyen Q, **Ryan PH**, LeMasters GK, Spitz H, Lobaugh M, Glover S, Grinshpun SA. School bus pollution and changes in the air quality at schools: a case study. *Journal of Environmental Monitoring*. 2009;11:1037.

12. Lockey JE, Hilbert TJ, Levin LP, **Ryan PH**, White KL, Borton EK, Rice CH, McKay RT, LeMasters GK. Airway Obstruction Related to Diacetyl Exposure at Microwave Popcorn Production Facilities. *European Respiratory Journal*. 2009;34:63-71.

13. **Ryan PH**, Bernstein D, Reponen T, Levin L, Grinshpun S, Villareal M, Lockey J, Hershey GK, Burkle J, LeMasters GK. Exposure to traffic related-particles and endotoxin during infancy is associated with wheezing at age three. *American Journal Respiratory and Critical Care Medicine*. 2009;180:1068-1075.

14. Biagini Myers JM, Wang N, LeMasters G, Bernstein DI, Epstein T, Lindsey M, Ericksen M, Chakraborty R, **Ryan P**, Villareal M, Burkle J, Lockey J, Reponen T, Khurana Hershey GK. Genetic and Environmental Risk Factors for Childhood Eczema Development and Allergic Sensitization in the CCAAPS Cohort. *Journal of Investigative Dermatology*. 2010;130(2):430-7.

15. Sucharew, H, **Ryan PH**, Bernstein D, Succop D, Khurana Hershey GK, Lockey J, Villareal M, Reponen T, Grinshpun S, LeMasters G. Exposure to Traffic Exhaust and Night Cough During Early Childhood: the CCAAPS Cohort. *Pediatric Allergy and Immunology.* 2010;21(2 Pt 1):253-9.

D. Research Support
Active:

1R21ES017957-01 (Ryan, PI) 10/01/2009-09/30/2011
NIH/NIEHS
Impact of Traffic-Related Particles on Asthma for Students in an Urban School District
This partnership between the University of Cincinnati, Cincinnati Health Department, and the Cincinnati Public Schools will build upon the strengths of each organization to collaboratively determine if children are exposed to increased levels of traffic-related PM at school compared to ambient levels in the communities where the children reside. I

R01 ES011170-08 (LeMasters, PI) 07/01/2007 - 06/30/2011
NIH/NIEHS
Diesel, Allergens, and Gene-Environment Interactions
The major goal of this project is to determine if infants who are exposed to diesel exhaust particles via truck exhaust in co-exposure with aeroallergy are at an increased risk for atopy and atopic respiratory disorders and to determine if this effect magnified in a genetically at risk population.

R01 ES016531 (Haynes, PI) 04/01/2008 - 02/28/2013
NIH/NIEHS
Marieta Community Actively Researching Exposure Studies (CARES)
The Marietta Community Actively Researching Exposure Studies (CARES) is a community-based study designed to explore the health effects of long term Mn exposure in children.

EP-R8-06-02 (Lockey, PI) 09/01/2008-02/28/2010
Waterstone/EPA subcontract
Medical Evaluation of Road Maintenance Workers in Dunn County, ND
The objective of the proposed study is to identify a population of road maintenance workers potentially exposed to erionite contained in road gravel in North Dakota and to determine the prevalence of pleural and interstitial changes in this population.

R21 ES016830-01A1 (Kovacic, PI CCHMC) 07/01/2009-06/30/2011
NIH (Wu, Subcontract PI)
Exposure-induced Systemic Oxidative Stress in Asthmatic Children
The major aim of this study will be to determine if DEP exposure modifies the genetic susceptibility of children with atopic allergic disease compared to non-allergic controls.

RFA: 08-1 (Ryan, PI) 03/01/2010-02/28/2011
Health Effects Institute
Analysis of Personal and Home Characteristics Associated With the Elemental Composition of PM2.5 in Indoor, Outdoor, and Personal Air in the RIOPA Study
The aims of this proposal will address significant research questions regarding the elemental composition of PM2.5 including: 1) What is the relationship between concurrent measurements of the elemental composition of PM2.5 in indoor, outdoor, and ambient air?, 2) What is the correlation structure of these elements within the concurrent measurements and are there clusters of elements within the composition of PM2.5 in indoor, outdoor, and personal air samples?, 3) Does the elemental composition of indoor, outdoor and personal air differ significantly across individuals and cities?, 4) What are the personal, home, and environmental factors significantly associated with specific elements or clusters of elements and do these factors differ by sampling strategy and city?, and 5) Can personal exposure to elemental constituents of PM2.5 be predicted using indoor and outdoor sampling profiles?

Completed:

HUD OHLHH0162-07 (Reponen) 11/15/2007-11/04/2010
Mold Exposure in Homes & the Development of Children's Atopy & Asthma
The major goal of this study is to identify a method that is most predictive for the adverse health effects caused by residential mold exposure, especially the development of asthma and allergic rhinitis.

RESPONSES TO RATING FACTORS

FACTOR 1. Capacity of the Applicant and Relevant Organizational Experience

1.1 The Capability and Qualifications of the Key and Supporting Personnel

The proposed project requires extensive expertise in indoor air quality evaluation, exposure assessment, and environmental epidemiology. The project's focus is the assessment of the synergistic effect of exposure to aeroallergens and traffic-related air pollution (TRAP) in the development of children's asthma. The study has a strong foundation on an existing birth-cohort study, the Cincinnati Childhood Allergy and Air Pollution Study (CCAAPS), which has been funded by the NIEHS and includes 762 children in the Greater Cincinnati metropolitan area. A subgroup of 176 children from this cohort recently participated in a HUD-funded study that focused on investigating the association between mold exposure (as assessed by multiple methods) and the development of asthma and allergic disease in children. In this grant application, the recently completed HUD-study will be further referred to as HUD-CCAAPS. To provide adequate expertise on the diverse aspects of the proposed project, the interdisciplinary, ***multi-institutional team*** includes the following key investigators:

University of Cincinnati (UC), Cincinnati, Ohio (primary applicant):

- [redacted], PI (Assessment of exposure to indoor mold and aeroallergens)
- [redacted], Co-I (Assessment of exposure to traffic-related air pollution)
- [redacted], Co-I (Statistical data analysis)
- [redacted], Co-I (Environmental epidemiology, exposure modeling)
- [redacted], Statistician (Statistical data analysis)
- [redacted], Research assistant (endotoxin and (1-3)-β-D-glucan analysis)

U.S. Environmental Protection Agency (EPA):

- [redacted], Co-I (Mold specific quantitative polymerase chain reaction [MQPCR], Environmental Relative Moldiness Index [ERMI])

Key Personnel: Resumes for key personnel are presented in Appendix 1. Below is a short summary of their qualification related to the proposed project.

[redacted] will be the Principal Investigator in the proposed project. [redacted] has 20 years of experience in indoor air pollution studies and is a Certified Indoor Air Quality Professional (The Association of Energy Engineers). [redacted] holds a Ph.D. degree in Environmental Sciences (1994), and is currently Professor of Environmental Health. Her laboratory and field studies of airborne and surface contaminants in residential houses have been widely published in the peer-reviewed scientific literature: she has authored or co-authored over 130 peer-reviewed articles. As an expert in indoor allergens and mold, she has served as the principal and a co-investigator in several major laboratory and field studies on airborne allergens, bacteria and fungi. [redacted] has been the PI of two HUD-supported grants (including the HUD-CCAAPS) and is currently the PI of a NIOSH-supported grant related to exposure to bioaerosol particles. She was also the leader of the exposure assessment team of the CCAAPS. This is the cohort from which the study subjects will be selected (see 2.3.1-2.3.3).

[redacted] is trained as a physicist with Ph.D. degree in aerosol science (1987) and is currently Professor of Environmental Health and Director of the Center for Health-Related

Aerosol Studies. For over 25 years, he has been involved in various aspects of sampling and analysis of airborne particles with particular focus on bioaerosols. During the past 19 years at the UC, he has served as the PI or program manager for grants and contracts supported by the US EPA, HUD, NIOSH, DoD, DHS and other agencies. [redacted] has also been a co-investigator in several major interdisciplinary environmental studies. [redacted] has published about 180 journal articles. He has served as an invited/keynote speaker, session chairman and panelist at professional conferences in the North America, Europe, Asia, and Australia. He has received several awards, including the International Smoluchowski Award in aerosol science (1996), eight AIHA awards (1996-2010), and the HUD Best Practice Award (2000). [redacted] is a co-investigator in the CCAAPS and HUD-CCAAPS projects.

[redacted] has served as a biostatistician in the Department of Environmental Health for over 25 years. [redacted] research includes the analysis of longitudinal discrete and continuous data, the effects of measurement/misclassification error on estimates of associations between environmental exposures and respiratory health, and most recently the application of nonlinear mixed models to standard curve estimation and calibration of allergen assay data. [redacted] is the lead statistician on the CCAAPS and HUD-CCAAPS projects and has been involved in the analysis of all exposure and health outcome data. Since 1989 [redacted] has also been the lead statistician for an industry sponsored study of the effects of an airborne exposure on pulmonary function and X-ray changes over time. [redacted] also serves as chief consultant for the Center for Biostatistical Services, a Core Center of the College of Medicine.

[redacted] is an epidemiologist and was the project coordinator of the CCAAPS before he was appointed as Assistant Professor. [redacted] has a MS and PhD in epidemiology. [redacted] is experienced in epidemiologic and statistical methods in addition to Geographic Information Systems and has developed spatial models for estimating diesel exhaust particulate exposure in the CCAAPS cohort. Working on the CCAAPS data, he has gained considerable expertise in investigating associations between clinical data and diverse exposure data.

[redacted]r received his Ph.D. in Environmental Microbiology from Ohio State University in 1983. [redacted] joined the US EPA National Exposure Research Laboratory in 1998 where he has been developing methods to quantify mold exposures based on patented DNA-based technology called mold specific quantitative PCR (MQPCR). [redacted] is a co-investigator in the CCAAPS and HUD-CCAAPS projects. He has also collaborated on numerous other large-scale studies of mold exposure with CASE Medical School, University of North Carolina, Tulane University, and Johns Hopkins Medical School. [redacted] has published 25 papers and book chapters on mold analysis in the last five years. (See letter of commitment from [redacted] in Appendix 2.)

[redacted] is a Research Associate and PhD student in Biostatistics, currently assisting [redacted] in performing statistical analyses in the Center for Biostatistical Services. [redacted]e has been involved both with the CCAAPS and HUD-CCAAPS projects.

[redacted] is a Research Assistant and currently assisting Drs. Reponen and Grinshpun is microbiological sample analysis. [redacted] processed and archived all the HUD-CCAAPS samples and analyzed these samples for endotoxin and (1-3)-β-D-glucan.

1.2 Past Performance of the Research Team in Managing Similar Research

1.2.1 University of Cincinnati

The Department of Environmental Health is one of the largest departments of the UC with a multi-million dollar annual grant portfolio. It has the necessary resources and is committed to provide adequate administrative support for the proposed project, including clerical and specialized support in accounting and equipment maintenance. It has a long history of research on detection and enumeration of hazardous particles and microorganisms in indoor environments, evaluation of the causes of childhood asthma and allergies, study of the pathways leading to various human exposures in residential environments, and development and testing of intervention methods for reducing exposures. Members of the UC team have successfully completed or are currently working on several relevant research projects with funding from federal, state, and private sources, including HUD, NIEHS, and NIOSH. These projects have resulted in numerous publications in major national and international peer-reviewed journals (at a rate of >10 peer-reviewed papers per year).

[redacted] has successfully managed multiple federally funded research efforts addressing exposure to various hazards in housing. She served successfully as the PI of two past HUD grants. The first one was #OHLHR0054-99: "Dynamic Dust Pick-Up Measurement to Monitor the Effectiveness of HEPA-Vacuuming after Lead Intervention", which was completed in time and within budget and resulted in two peer-reviewed publications. The second one is being completed (#OHLHH0162-07: "Mold Exposure in Homes & the Development of Children's Atopy & Asthma", HUD-CCAAPS; PI: Dr. Reponen; end date: October 31, 2010); it has so far resulted in two peer-reviewed papers; four more are being prepared (see details in section 2.3.3).

[redacted] track record as the PI lists over 20 externally-funded research projects on topics relevant to the proposed grant The list includes three HUD-supported efforts (#OHLPR0016-97: "Behavior and Transport of Leaded Particulates in Indoor Environments," #OHLHH0099-01: "Evaluation of a New Low-Cost Method for Identification and Assessment of Mold Problems in Housing" and #OHLHH0155-06: "Contaminants from Surfaces in Flooded Homes of New Orleans: Development, Evaluation and Implementation of a New Cost-Effective Protocol"), which were completed on time and within the budget and received the highest performance evaluations from HUD. These efforts resulted in a dozen peer-reviewed publications. [redacted] research on determining the clearance waiting period for lead abatement in homes was recognized by HUD through the Best Practice Award (2000).

[redacted] is currently the PI of two grants: a R21 three-year NIEHS-sponsored Partnership for Environmental Public Health intervention study with the objective of assessing and reducing children's exposure to traffic-related air pollution at schools in order to improve the health of asthmatic children and a Health Effects Institute-sponsored award to examine the elemental composition of $PM_{2.5}$ and identify environmental, demographic, home, and other factors associated with personal exposure.

1.2.2 US EPA

[redacted] was a co-investigator in [redacted] HUD-grant ("Mold Exposure in Homes & the Development of Children's Atopy & Asthma"). He has also been a participant in many large-scale, multi-institutional studies. For example, he was the lead on the analysis of dust samples from the HUD "Urban, Mold and Moisture Project" (#OHLHH0065-99) performed by Cuyahoga County and CASE Medical School. This study showed an increased likelihood of asthma symptoms with an increase in Relative Moldiness Index (Vesper et al., 2006; Kercsmar et al., 2006). Remediation of the water damage in the asthmatic's home significantly reduced the need for medical intervention for the asthma symptoms in these children. In the aforementioned CCAAPS project, Dr. Vesper was responsible for the MQPCR analysis of the dust of about 270

homes. Again, higher RMI values were associated with respiratory health problems in these children Vesper et al., 2007a). [redacted] was in charge of the MQPCR analysis of the dust samples from nearly 1000 homes in the HUD 2006 American Healthy Homes Survey and the analysis of 200 homes in Detroit in which the incidence of asthma and mold is being investigated. [redacted] is also responsible for the analysis of about 200 homes in the NIEHS "HEAL" study in New Orleans in collaboration with Tulane University.

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All the key investigators and several staff members budgeted for this project have collaborated in a large ongoing birth cohort study, CCAAPS, funded by the NIEHS. This study involves collection, management, analysis, and interpretation of clinical, environmental (indoor and outdoor air quality), epidemiological and genetic data for 762 children. The epidemiological team alone has included 6-20 members, and the environmental sampling team had 2-10 members, depending on the phase of the study. The CCAAPS study has so far resulted in 44 peer-reviewed publications and the clinical part of the study is funded through 2011. All key investigators and staff members also participated in the HUD-CCAAPS project, which was a sub-cohort of the CCAAPS. [redacted]n collaborate in an ongoing study conducted with the Cincinnati Health Department and Cincinnati Public Schools on the effect of traffic pollution in children's health at schools.

Furthermore, the applicants have a record of collaboration with various research groups and institutions nationwide and internationally, including several recipients of major HUD grant awards on the identification, quantification and control of indoor health hazards. This collaboration will continue, which is believed to increase cost-effectiveness of the proposed project through coordinating this research effort with other HUD-supported activities. [redacted]are currently collaborating with [redacted] in a HUD-funded project "Bacteria and bacterial immunomodulators in moisture damaged versus reference homes."

FACTOR 2. Need/Extent of the Problem

2.1 Response to Primary Objectives and Target Areas Identified by HUD

This proposal responds to the HUD RFA (Docket No. FR-5415-N-13): *Lead technical Studies and Healthy Homes Technical Studies Program*. It addresses three objectives of the RFA:

(d) Investigation of the epidemiology of housing-related hazards and illness and injury associated with these hazards, with an emphasis on vulnerable populations (e.g., children, senior citizens).
(e) Analysis of existing data or generation of limited 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 residential exposure and childhood illness or injury.

The project will use an existing birth cohort (CCAAPS) to assess if the association between aeroallergen exposure in homes and the development of asthma in children is modified by co-exposure to TRAP. Among the CCAAPS families, there are 330 families with a combined family

income of less than $40,000/year, 91 families with less than $20,000/year, 143 families with African American head of household, and 187 non-African American mainly of Appalachian white descent.

Overall, this grant application focuses on the key housing-related health hazards: allergens and asthma and mold and moisture and their impact on childhood respiratory health. Results on aeroallergen exposures have been obtained by using traditional and newly-developed cost-effective methodologies. This study will have significant public health impact as it will generate unique new insights to help understand the health effects of indoor aeroallergens and improve early prediction, testing and diagnosis of disease that ultimately may reduce morbidity and mortality.

The project includes significant interaction with the community as the environmental sampling was performed in occupied homes and the families have been requested to bring their children to a participating clinic for an annual physician evaluation. The families have received the results of environmental assessment (walkthrough, dust sampling, air sampling) together with information on how to reduce exposures, including the HUD "Healthy Homes" booklet. The results of the data analysis proposed in this study will be shared with the CCAAPS families during the annual picnic that the CCAAPS organizes inviting all families recruited into the study. This community outreach activity will allow the investigators to communicate the main findings of the study to the participating individuals, answer their study-related questions, and distribute information on healthy housing. Families also receive yearly newsletters, holiday cards, and can get updates of the study at the CCAAPS web-site (http://eh.uc.edu/ccaaps/).

2.2 Extent of the Problem

2.1.1 Health effects associated with moisture-related biocontaminants in housing

Allergic disorders including asthma cause a major public health concern. Over 50% of children in the U.S. public have allergies (Arbes et al., 2005b) and more than an estimated 20 million people have asthma, which results in nearly 500,000 hospital stays each year (Asthma and Allergy Foundation of America, 2006). Particularly alarming is the high asthma rate in children: in 2005, 12.7% children in the U.S. had been diagnosed with asthma at some point in their childhood of whom 70% were reported to currently have asthma (Akinbami, 2006). Both the prevalence of asthma and the asthma mortality rates among African American children are greater than among Caucasians. The prevalence of asthma in 2004-2005 was 7.9% among Caucasian and 12.8% among African American children 0-17 of age. The corresponding mortality rates per 1,000,000 were 1.5 and 9.0, respectively (Akinbami, 2006). Both Ohio and Kentucky are among the nine states in the USA, in which the asthma prevalence rate exceeds 10% (10.2% and 10.5%, respectively). Asthma is the most common chronic disease of childhood and the most common cause of pediatric hospital admissions (Adams and Marano, 1994). Nationwide, the asthma prevalence rate for 5-10 year old children (the target population of this study) was 9.3% (Akinbami, 2006). The cost of asthma in the U.S. was estimated at 12.7 billion dollars, including direct medical expenditure (58% of the cost) and indirect cost (lost school or work days, housekeeping, mortality) (Weiss and Sullivan, 2001). Allergic rhinitis is also a common allergic condition, affecting 8-16% of the US population with an associated annual direct medical cost of 1.2 billion dollars (Weiss and Sullivan 2001). The medical cost burden of allergic rhinitis is likely underestimated as persons with allergic rhinitis often do not seek health care but use over-the-counter medication.

Mold exposure in homes is common and became to the forefront in the aftermath of Hurricane Katrina. A recent survey performed in a nationally representative random sample of 822 homes found that 52% of U.S. homes have mold/moisture problems defined as Yes/No in occupants' interview and by observations by a field team (Salo et al., 2005). Thus, exposure to mold in homes is more common than exposure to environmental tobacco smoke (Pisrkle et al., 1996). Mold is known to exacerbate allergic symptoms including allergic rhinitis. Most molds produce highly allergenic proteins or glycoproteins that can cause hypersensitivity diseases in susceptible hosts (Flannigan et al., 1991; Nevalainen et al., 1991). Between 10% and 60% of genetically susceptible (atopic) persons develop hypersensitivity (allergy) to mold, as demonstrated by skin tests (IOM, 1993). Sensitization to fungi, such as *Alternaria*, is strongly associated with symptoms of allergic rhinitis, but the role of fungal exposure in the development of this disease in unknown. A recent study by Stark et al. (2005) showed that high levels of dust-borne *Aspergillus, Aureobasidium*, and yeasts measured in children's homes at age three months were associated with doctor-diagnosed allergic rhinitis in the first 5 years of life. The Institute of Medicine report on "Damp Indoor Spaces and Health" states that there is sufficient evidence to conclude that a causal relationship exists between the presence of mold and the following health outcomes: upper respiratory tract symptoms, cough, hypersensitivity pneumonitis in susceptible persons, wheeze, and asthma symptoms in sensitized asthmatic persons (IOM, 2004). At the same time, the report concluded that the role of mold exposure in the development of atopy, asthma, and allergic rhinitis is unclear. Mudarri and Fisk (2007) estimated that, if the reported associations between mold and moisture and asthma were causal, 21% of the cases of asthma in the United States could be attributable to dampness and mould in housing, for a total annual national cost of $3.5 billion. A recent review by a WHO working group concluded that there is currently sufficient evidence for the association between indoor dampness and asthma development (WHO Europe, 2009).

Beta-glucan is a major cell wall component of fungi, pollen and some bacteria. It comprises up to 60% of the cell wall of fungi and thus, has been used as a surrogate measure of fungal biomass (Chew et al., 2001; Rao et al., 2004; Douwes et al., 2006). Moreover, (1-3)-β-D-glucan exposures have been associated with common respiratory symptoms such as airway inflammation (Rylander 1998; Thorn and Rylander, 1998). Recent studies with infants (Douwes et al., 2006) and schoolchildren of age 5-13 (Schram-Birkerk et al., 2005) have shown that exposure to (1-3)-β-D-glucan may be associated with decreased wheezing and allergic sensitization. Our recent study of CCAAPS infants at ages one and three also supports this conclusion (Iossifova et al., 2007, 2009). These findings indicate a strong immunomodulating effect of this fungal component, resembling those related to endotoxin exposure. Thus, health effects may be dependent on the developmental status of the child as well as the type and level of exposure.

In addition to mold, water damage and excessive moisture may be related to an increase in other housing-related hazards, such as endotoxin and house dust mites, which may cause similar health effects as mold. Endotoxin consists of lipopolysaccharides, a component of the outer membrane of Gram-negative bacteria, and has been measured at elevated levels in moisture-damaged buildings (Rao et al., 2007). Studies focusing on adult populations have shown adverse health effects, such as acute airway obstruction, decrease in pulmonary function, respiratory symptoms, increased asthma severity (Liebers et al., 2006). However, several authors have postulated that early-life exposure to high amounts of endotoxin in the home or farm

environment could reduce the risk for atopy by suppressing molecular pathways responsible for IgE-mediated atopic disease (Liu et al., 2002; Martinez et al., 2001; Von Mutius et al., 2000).

Dust mite allergen is one of the most ubiquitous indoor allergens. Dust mites feed on organic matter, such as human skin scales, and fungi (Gravesen, 1978; Platts-Mills et al., 1997). Dust mites are sensitive to relative humidity (RH), with greatest survival at RH=70-85%. Much of the allergenicity attributed to dust mites is due to their fecal pellets, measuring from 10 to 40 μm in diameter (Tovey et al., 1981). Exposure to dust mite allergen is associated with increased prevalence of positive skin tests and increased concentration of IgE specific to dust mite by the age of five in children of atopic parents (Rowntree et al., 1985). Sensitization to dust mite allergens has been shown to be the single strongest risk factor for asthma in some populations, and that the concentration of dust mite allergen in the bed is significantly correlated with asthma severity (Squillace et al., 1997; Wickmann et al., 1993; Leung et al., 1997; Sporik et al., 1990; Custovic et al., 1996). Recent evaluation of NHANES III data revealed that 27.5% of the population (ages 6-59) was allergic to dust mites, which is higher than that for cockroach or cat (Arbes et al., 2005a).

Cat, dog, and cockroach allergens can also contribute to the adverse health effects caused by indoor aeroallergens. Cat and dog allergens are universally present in US homes, and even homes that do not have pets commonly have levels that have been associated with an increased risk of allergen sensitization (Arbes et al., 2004). Elevated levels of cockroach allergens are more common in households with low income (<$20,000) and have been associated with the presence of cockroach (Cohn et al., 2006, Cho et al., 2006b).

2.1.2 Effects of traffic-related pollution and potential interaction with aeroallergens.

The causes and aggravating factors of pediatric asthma likely include a combination of genetic disposition, demographic factors, psychosocial stressors, and environmental exposures (Keeler et al., 2002; Sears, 1997; Weiss et al., 1992). Traffic-related particulate matter, including diesel exhaust particulates (DEP), has been shown to exacerbate existing asthma including decreased lung function (Delfino et al., 2004; Trenga et al., 2006), emergency department visits for asthma (Sun et al., 2006; Norris et al., 1999), and asthma symptoms and medication use (McConnell et al., 2003; Slaughter et al., 2003; Millstein et al., 2004; Schildcrout et al., 2006; Gent et al., 2003). The association between exposure to air pollution and development of asthma, however, is less clear though recent research has found incident asthma to be associated with exposure to traffic-related air pollution (Jerrett et al., 2008, Brauer et al., 2007).

Residential proximity to roadways is conventionally used as a surrogate of traffic-related exposure due to the rapid decay of these pollutants from their source (Hirsch et al., 1999, Ryan et al., 2005, Zhu et al., 2002). For example, NO_2, a common marker of traffic-related pollution, has been shown to have two to three fold differences within 50 meters of their source (Hewitt, 1991) and particulate sulfur concentrations decrease by one-half between 50 and 150 m from a highway (Reponen et al., 2003). Ultrafine particles have also been shown to be elevated above background concentrations to 300 m from highways (Zhu et al., 2002). Proximity to major roads (as a surrogate of exposure) has been associated with decreased lung growth (Gauderman et al., 2007), increased asthma symptoms (Morgenstern et al., 2008), increased airway inflammatory markers, including exhaled nitric oxide (eNO) (Dales et al., 2008), and increased oxidative stress markers (Romieu et al., 2008).

In urban areas, an important source of particulate matter is diesel combustion (Riedl and Diaz-Sanchez, 2005). The combustion of diesel fuel results in the production of DEPs, nitrogen oxides, and ozone precursors (Riedl and Diaz-Sanchez, 2005). The majority of DEPs are fine (0.1-2.5 μm) or ultrafine (< 0.1 μm) in size and consist of an elemental carbon core with a large surface area per unit of mass capable of binding chemicals or transition metals (Riedl and Diaz-Sanchez, 2005). The size, physical properties, and large surface areas of DEPs may result in larger biological effects when compared to other sources of PM and other air pollutants.

DEPs also have been demonstrated to influence cytokines associated with T_H2 responses including IL-4 (Wang et al. 1999), IL-5 (Diaz-Sanchez et al., 1996), IL-10, and IL-13 (Peden, 2000). Though DEPs have been shown to be able to increase cytokines alone, the effect of DEPs may be greater in conjunction with allergens (Takano et al., 1997) and may promote new allergic sensitization to antigens (Diaz-Sanchez et al., 1999). The induction of T cells to differentiate into a T_H2 phenotype may occur as a result of the adjuvant effect of DEPs with allergens (Pandya et al., 2002).

DEPs also influence the immune response to allergens through their ability to physically bind with them and be transported together into the airways (Pandya et al., 2002). DEPs have been found to bind with grass pollen allergen (Lol p 1), dog allergen (Can f 1), birch (Bet v 1), cat (Fel d 1), and house dust mite (Der p 1) (Knox et al., 1997; Ormstad, 2000). Additionally, though DEPs are capable of binding allergens, co-deposition of unbound DEP and allergens in close proximity to each other may be important regardless of whether they are bound. A study conducted in rats showed that the combination of DEP and timothy grass acts synergistically to enhance allergic responses, though they do not bind *in vitro* (Maejima et al., 1997). A study of nonsmoking adults demonstrated that exposure to DEPs and ragweed leads to increased expression of T_H2 cytokines and decreased levels of T_H1 cytokines (Diaz-Sanchez et al., 1997). Another study of allergic adults found that exposure to DEPs and the allergen to which the adult was sensitized caused an increase of IL-4 and IL-6 (Wang et al., 1999). A similar result was found with adults sensitized to dust mites who, when challenged with dust mites and DEP, were found to have triple the level of nasal histamine when compared to exposure to dust mite alone (Diaz-Sanchez et al., 2000).

Exposure to DEP and endotoxin has been shown to work synergistically to enhance free radical generation in the lungs (Arimoto et al., 2005). Endotoxins are inflammatory lipopolysaccharide (LPS) molecules on the cell wall of gram-negative bacteria. Previous studies have shown that exposure to endotoxin or surrogates of endotoxin (i.e., pet ownership) is protective against the development of allergic disease (Braun-Fahrlander et al., 2002; Simpson et al., 2006). Other investigators, however, have found that exposure to high levels of endotoxin increases the risk of wheeze during early childhood (Park et al., 2001; Perzanowski et al., 2006). Celedon et al. (2007) have recently demonstrated that exposure to endotoxin during infancy was inversely related to atopy but was positively associated with wheezing at ages 1-7 in a high risk cohort. In our study (CCAAPS), we have found that exposure to multiple dogs and high endotoxin during infancy was protective for wheezing at age one (Campo et al., 2006). Hence, the effect of endotoxin exposure may be dependent upon the time period of exposure, the outcome of interest (atopy or wheeze), the population studied, and other modifying factors including genetic susceptibility and other environmental exposures.

It has been hypothesized recently that synergistic and/or antagonistic interactions between immune function development and structural damage to the lung may account for conflicting results related to the hygiene hypothesis (Yeatts et al., 2006). Co-exposure to outdoor traffic-

related air pollutants and indoor environmental exposures including endotoxin and allergens may be of particular importance as each has been shown to influence immunologic development and generate ROS resulting in lung damage. For example, the combined exposure to DEP and endotoxin has been shown to enhance neutrophilic lung inflammation and work synergistically to promote formation of ROS (Arimoto et al., 2006; Takano et al., 2002). Additionally, a study of asthmatic school-age children found that among children who owned a dog the association between air pollution exposure and asthma symptoms was enhanced (McConnell et al., 2006).

2.3 Relevant Pilot Studies Done by the Applicants

2.3.1 Results from the CCAAPS effort

The CCAAPS investigates a birth cohort of children, who have at least one atopic parent (LeMasters et al., 2006). Initially, the cohort included 762 children with approximately 81% (n= 619) remaining through age seven. The drop-out rate was highest in the first year but has stabilized under 3%. The CCAAPS was designed to assess the effects of diesel and other environmental exposures (including animal, mold and pollen allergens) on the development of children's atopy and asthma. This study included extensive outdoor sampling for diesel, mold, and pollen, as well as indoor exposure assessment during the first seven years of children's life. Children have been clinically examined at ages 1, 2, 3, 4, and 7. The clinical exam included a detailed symptom questionnaire and skin prick test to a panel of 15 aeroallergens and 2 foods (LeMasters et al., 2006). Additionally, at age 7, asthma was diagnosed. Exhaled nitric oxide (eNO) and pulmonary function tests were performed. Bronchodilator and methacholine challenge was conducted for children to aid the asthma diagnosis (see Specific Aim 3 in section 3.1.2 for details on asthma diagnosis).

All homes have had at least one indoor exposure assessments conducted during the initial four years of the study. Dust sampling and home inspection was done in every home prior to the child's first birthday. Walkthrough evaluation included questions and observations regarding visible mold and presence of pets in homes. Floor dust samples were collected from the child's primary activity room. Additional dust samples were collected in selected homes when the children were 2-4 years old. Air sampling was performed in 242 selected homes during years 2-4 (Osborne et al., 2006). At age seven, indoor exposure assessment was repeated in a subgroup of 176 homes that belonged to HUD-CCAAPS. It included dust and air sampling. The indoor exposure assessment has been summarized in Table 1.

A dust sampling protocol was developed and pilot-tested in the CCAAPS. This protocol follows closely the HUD dust sampling protocol (HUD, 2004). Dust samples were collected using a vacuum cleaner (Filter Queen Majestic®; HMI Industries Inc., Seven Hills, OH) at a flow rate of 800 L/min. A custom-made cone-shape HEPA filter trap (Midwest Filtration, Cincinnati, OH) was attached to a nozzle of the vacuum cleaner for dust collection. In the pilot study, flow rates, pressure changes, and collection efficiencies were tested using different types of filter traps and vacuum cleaners. The HEPA filter trap showed a collection efficiency of over 95% for particles larger than 0.3 μm (Cho et al., 2006b). The cone-shape filter trap increased the vacuum flow rate by 10% compared to a rectangular filter trap. The selected vacuum cleaner was able to maintain a high flow rate with only 3% pressure drop when it was used with the HEPA filter trap. An area of at least 2 m^2 was vacuumed at a rate of 2 min/m^2 (Cho et al., 2006b). Information on the size of the sampled area and floor material was recorded. The dust

sample was sieved (355 μm sieve), and the fine dust was divided into sub-samples and stored at -20°C before analyses.

Table 1. Summary of indoor exposure assessment in the CCAAPS and HUD-CCAAPS cohorts.

Child's age	Number of homes	Home assessment	Results
1	758	Walkthrough	Visible mold and water damage, moldy odor
		Dust sampling[a]	All samples: Cat, dog, house dust mite, cockroach
			176 samples:[b] ERMI, endotoxin, (1-3)-β-D-glucan
2-4	242	48-hour air sampling with the Button sampler	Total fungal spore count and most prevalent fungal types
	459[c]	Dust sampling[a]	Cat, dog, house dust mite, cockroach
7[b]	176	Walkthrough	Visible mold and water damage, moldy odor
	176	Dust sampling[a]	ERMI, endotoxin, (1-3)-β-D-glucan, cat, dog, house dust mite, cockroach, mouse.
	176	24-hour air sampling with the Button Inhalable Aerosol sampler	Endotoxin, (1-3)-β-D-glucan, Total fungal spore count and most prevalent fungal types
	176	24-hour air sampling with the 2-stage cyclone sampler	Endotoxin, (1-3)-β-D-glucan

[a]All dust sample results are expressed both as concentration (per mg of dust) and loading (per m^2 of floor area)
[b]HUD-CCAAPS sub-cohort
[c]140 of these homes belong to the HUD-CCAAPS sub-cohort

Air samples were collected using the Button Inhalable Aerosol Samplers and NIOSH 2-stage cyclone samplers simultaneously with dust sampling to measure airborne aeroallergens in selected homes. Two measurement units were used for dust sample quantifications: traditional concentration (μg/g) and loading (μg/m^2).

Inspections accessing the area of visible mold of the 758 CCAAPS homes showed that 45% of homes did not have any signs of water or mold damage, nor moldy smell (Mold Class 0), 50% of homes had some mold and/or water damage (Class 1) and 5% of homes had severe mold damage (visible mold >0.2 m^2 = Mold Class 2) (Cho et al., 2006a). Exposure to visually observed mold contamination in Year 1 (at children's age one) was associated with increased recurrent wheezing and rhinitis at age one (Biagini et al., 2006; Cho et al., 2006a; Iossifova et al., 2007) as well as with increased recurrent wheezing and increased risk of having a positive asthma predictive index at age three (Iossifova et al., 2009). In contrast, early exposure to high level of fungal (1-3)-β-D-glucan and high endotoxin exposure in the presence of multiple dogs were associated with decreased risk of recurrent wheeze, allergen sensitization, and positive asthma predictive index (Campo et al., 2006; Iossifova et al., 2007, 2009).

Long-term air samples analyzed by traditional microscopic counting showed that the most prevalent fungal type was *Aspergillus/Penicillium* (frequency of occurrence was about 98%) (Osborne et al., 2006; Lee et al., 2005). Different associations were found with the health outcomes depending on the mold species. Children who had increased exposure to *Alternaria* and *Penicillium/Aspergillus* were more likely to have positive skin prick test to aeroallergens or food, i.e., be atopic. Increased exposure to Basidiospores increased the risk of rhinitis. In contrast, increased exposure to *Cladosporium* decreased the risk of being atopic (Osborne et al., 2006). Furthermore, dust-borne (1-3)-β-D-glucan exposure was associated with decreased risk for recurrent wheezing at age one (Iossifova et al., 2007). Interestingly, a separate laboratory

study showed that among the spores most commonly found in the CCAAPS homes, *Cladosporium* spores contained the highest amount of (1-3)-β-D-glucan (Iossifova et al., 2008).

2.3.2 MQPCR-analysis and ERMI

[redacted], a co-investigator of this study, has developed a DNA-based MQPCR method for the analysis of fungi. This technology allows for the highly standardized, objective analysis of mold and is being used by numerous commercial firms in the US. The application of this technology to the HUD, 2006 American Healthy Home Survey allowed for the development of the Environmental Relative Moldiness Index (ERMI). The ERMI scale allows for homes across the US to be compared in terms of their "mold burden". This scale was applied in a number of studies. In Cleveland, increased ERMI levels were associated with increased likelihood of asthma diagnoses in children (Vesper et al., 2006).

When applied to the CCAAPS cohort, the ERMI was found to be more predictive of the development of wheeze and/or rhinitis than visual home inspection (Vesper et al., 2007a). Similar to the national average (Vesper et al., 2007b) about 25% of the CCAAPS homes have ERMI≥5. A cross-sectional study in North Carolina asthmatic children's homes, found asthma symptoms associated with higher ERMI values (Vesper et al., 2007c).

2.3.3 Exposures vs. asthma diagnosis at age seven in the HUD-CCAAPS cohort

At age seven, 18% (31/176) of the HUD-CCAAPS children were diagnosed with asthma by a physician. Unadjusted odd ratios (OR) and 95% confidence intervals (CI) for the associations between asthma at age seven and exposures at age one and seven were obtained by logistic regression. The associations between $\log_e$-transformed eNO and exposures were investigated by Tobit regression. Only higher ERMI value in infants' homes at age one was predictive of an increased risk of asthma at age seven (OR=1.05; CI=1.01-1.11). The odds of developing asthma for infants increased 5% for each unit on the ERMI scale. Age seven ERMI was not predictive of asthma development. Of the two groups of molds that comprise the ERMI, the Group 1 water-damage mold populations were in significantly higher concentration in the homes of infants that developed asthma but not the Group 2 molds, which penetrates into the homes primarily from outside sources. Family and home characteristics associated with higher ERMI values in infants' homes were race (African American), low income (<$40K/yr), indoor smoking, living in older homes (built before 1955) and lack of air conditioning. ERMI values were independent of parental history of asthma, season of birth, carpeting and presence of dehumidifier. Therefore some cases of asthma might be prevented by eliminating water problems in housing. The ERMI scale appears to provide a useful metric to estimate mold burdens in homes.

In contrast to ERMI, inhalable (1-3)-β-D-glucan (OR=0.73; CI=0.58-0.91) and endotoxin (OR=0.82; CI=0.67-1.00) at age seven were associated with a decreased risk of asthma. Furthermore, a one-unit increase in $\log_e$ PM1 endotoxin at age seven was associated with a reduction in eNO (percent reduction = 86%; CI=76-98%). In summary, our preliminary results show that mold exposure at age one, measured by ERMI, was associated with asthma development at age seven. In contrast, endotoxin and (1-3)-β-D-glucan were inversely associated with asthma and eNO, and this was found from the analysis of air but not dust samples.

2.3.4 Measurement of traffic-related air pollution

2.3.3.1 The Cincinnati Anti-Idling Campaign (CAIC) study

The CAIC study (Ryan, PI) is a community-based research partnership between environmental health researchers at the University of Cincinnati (UC), the Cincinnati Health Department (CHD), and the Cincinnati Public Schools (CPS). This unique partnership was formed to address the community's concern regarding children's exposure to traffic-related particles and DEP at schools and their impact on childhood asthma. The three objectives of this three-year study are to determine if children are exposed to increased traffic-related pollution at schools, develop and implement a community-driven anti-idling campaign to reduce children's exposure to traffic-related air pollution, and evaluate the intervention by assessing the reduction of exposure in schools and the health of children with asthma attending these schools.

Four CPS schools (Hays-Porter, Roberts, Silverton and Winton Hills) were chosen to participate in the CAIC study based on their distance from a major road (greater or less than 400 m) and the number of buses per day (greater or less than 8). Community sampling sites located in the residential areas where children attending each school live were also identified. Asthmatic children attending each of these four schools were invited to participate in the health assessment portion of the CAIC study, including caregiver and child demographic, exposure, and respiratory health questionnaires, spirometry, measurement of exhaled nitric oxide (eNO) and collection of exhaled breath condensate. A total of 110 caregivers provided consent for their child to participate in the CAIC study.

The indoor and outdoor aerosol is characterized with respect to the particle number concentrations and size distributions as well as the PM2.5 mass concentrations and elemental compositions. Ambient air sampling was conducted in the spring of 2010 for five school days at each participating school in three locations; an indoor, outdoor and community site. Preliminary data show that the time-weighted average of the total number concentration measured outside the schools was significantly associated with the bus and the car counts (Hochstetler et al., 2010). Significant relationships were identified between indoor and outdoor aerosols for EC, EC/OC, and the total particle number concentration. Day-to-day and school-to-school variations in Indoor/Outdoor (I/O) ratios were related to the observed differences in opening windows and doors, which enhanced the particle penetration, as well as indoor activities at schools. The sampling will be repeated in the spring 2011 and the association between health outcomes and air pollution data will be assessed.

In the proposed study, the partnership formed with the Cincinnati Health Department in the CAIC study on investigating the health effects of traffic pollution will be extended to indoor air exposures (see support letter in Appendix 2).

2.3.3.2 Interaction between endotoxin and traffic-related particles

The impact of co-exposure to endotoxin and traffic-related particles has been examined in the CCAAPS (Ryan et al., 2009). Ambient air sampling was conducted at a total of 27 sampling sites in the greater Cincinnati area using Harvard PM2.5 samplers from December 2001 through December 2006 (Martuzevicius et al., 2004; Hu et al., 2006; Ryan et al., 2007). The average daily level of elemental carbon attributable to traffic, a marker of DEP, was derived for each of these sampling sites. Regression models were developed to relate this marker of DEP to land-use and traffic variables. The final LUR model had an R^2=0.73 and contained independent variables related to elevation, truck intensity, length of bus routes, and wind direction. A time weighted average exposure to traffic-related particles was determined by applying a land-use regression model to the homes, daycares, and other locations where children spent time from

birth through age 36 months (Ryan et al., 2007). Indoor levels of endotoxin were measured from dust samples collected before the participating children turned age one. The relationship between dichotomized ($< / \geq 75^{th}$ percentile) traffic-related particle and endotoxin exposure and persistent wheezing, controlling for potential covariates, was examined. Persistent wheezing at age 36 months was significantly associated with exposure to increased levels of traffic-related particles prior to age one (OR = 1.75, 95%CI = 1.07 – 2.87). Co-exposure to endotoxin had a synergistic effect with traffic exposure on persistent wheeze (OR = 5.85, 95% CI 1.89-18.13) after adjustment for significant covariates. This finding supports previous toxicological studies demonstrating a synergistic production of ROS after co-exposure to DEP and endotoxin.

2.4. How the Proposed Project will SignificantlyAdvance the Current State of Knowledge

Most of the previous asthma studies have addressed one type of exposure at a time and have not included the combined effect of indoor and outdoor air pollutants. Our results on contrasting effects of different types of aeroallergen exposures (ERMI was positively whereas endotoxin and (1-3)-β-D-glucan were negatively associated with health outcomes) and the synergistic effect between endotoxin and traffic-related particles are intriguing. The findings call for a follow-up investigation to determine if traffic related particles and endotoxin have synergistic effect on the asthma development and if other indoor aeroallergens have similar synergy with traffic related air pollution. The CCAAPS cohort provides a unique dataset to investigate, using quantitatively assessed aeroallergen levels and estimated traffic exposure, the impact of multiple indoor and outdoor environmental exposures. With funding from HUD for the proposed study we will be able to piggy back on the previously collected cleaned data to more broadly investigate the synergistic effect of the exposure to indoor aeroallergens and traffic-related air pollution. The proposed effort will have significant public health impact as it will generate unique new insights that will help our understanding of allergic diseases related to environmental exposures in homes. These findings should lead to improved early prediction, and cost-effective testing for potential causes of allergic disease, ultimately leading to intervention practices and thereby in decreased morbidity and mortality.

2.5. How the Study Findings Can be Used to Improve Current Methods for Assessing the Indoor Air Hazards

Our data base on indoor exposures includes multiple types of assessments using visual observations, dust sampling and long-term air sampling (see Table 1). Knowledge on how the different types of exposures are associated with the health outcomes will help in selecting the most cost-efficient method for assessing the relevant indoor air hazards. Information on the interaction between traffic-related exposures and indoor aeroallergens is important for urban planners in regards of locations of homes and schools relative to highways. We plan to use the data generated in the proposed study in a future collaboration with the Cincinnati Health Department (see support letter in Appendix 2). The city seeks our help in establishing local comparison values for the key housing related health hazards and in planning housing interventions.

2.6 Summary

The major research questions to be answered in this study are:

1) What is the role of home exposure through years one and seven in the development or exacerbation of allergic disease?
2) What is the synergistic effect of exposure to aeroallergens and traffic-related air pollution?
The proposed team of investigators is uniquely positioned to fill in these knowledge gaps in a very cost effective manner, by using the data from CCAAPS and HUD-CCAAPS projects in the proposed study as described below. The team has recently adopted and used several novel and improved methods (fungal fragment collection and analysis, MQPCR and ERMI) for exposure assessment of moisture-related contaminants; the results are available for the proposed study.

FACTOR 3. Soundness of Approach

3.1 Soundness of the Study Design

3.1.1 Hypothesis and specific aims

Hypothesis: The association between aeroallergen exposure and the development of asthma in children at age seven is modified by exposure to traffic-related air pollution (TRAP).

Specific Aim 1: Determine child-specific average and cumulative exposure to TRAP from birth through age seven utilizing geographic information system-based models and address history.

Specific Aim 2: Determine child-specific average and cumulative aeroallergen exposure levels from birth through age seven, combining currently available and newly obtained exposure levels to incorporate change of residence into the exposure estimates.

Specific Aim 3: Perform multiple logistic and linear regression analyses to assess the synergistic effects of aeroallergen exposures and traffic-related air pollution on asthma, allergic asthma, allergen sensitization, and eNO.

3.1.2 Research design

The study will include the 176 children who have recently participated in the HUD-CCAAPS study. These children were selected based on their exposure at age one. Half of them had high mold exposure and half had no mold exposure as was determined by visual assessment at age one.

Specific Aim 1: *Determine child-specific average and cumulative exposure to TRAP from birth through age seven utilizing geographic information system-based models and address history.*

In order to assess children's exposure to TRAP from birth throughout childhood, weighted road density models using geographic information systems (GIS) will be developed and validated (Rose et al., 2009). This hybrid semi-quantitative exposure model will be applied to all residential locations where a child was reported to have lived from birth through age seven. The primary objective of Specific Aim 1 is to develop an accurate proxy of exposure to TRAP that does not require intensive air sampling or traffic data while incorporating all road network data that may influence the levels of TRAP exposure.

A GIS database will be utilized for the development of the weighted road density model using ArcGIS (Environmental Systems Research Institute Inc.) and Space-Time Intelligence System (STIS) software (BioMedware, Inc., Ann Arbor, MI). GIS and STIS will enable the integration of spatial data including the complete road network that may significantly impact exposure with the location of each subject in time and space. The complete database for residential, daycare, and school history of all subjects will be geocoded (EZLocate, TeleAtlas Inc., Lebanon, NH). U.S. Census Bureau TIGER files will be utilized for the complete road network in the study area including side streets.

Prior to the development of the road density model, a qualitative exposure assessment will be conducted by assessing the proximity of subjects' homes, schools, daycares, and other locations to sources of TRAP. The proximity model developed in the proposed study will provide an initial straight forward approach to assessing exposure. Locations where the children spend at least 8 hours per week beginning at birth have been collected via questionnaire at ages one, two, three, four, and seven. These locations will be extended at age eight and will capture locations including homes, schools, daycares, babysitters, and other locations in order to assess time-activity patterns. All locations will be geocoded using EZLocate and entered into STIS software (Biomedware, Inc.). Proximity to moving and stop/go bus and truck traffic (Ryan et al., 2005) will be assessed by determining the shortest distance to the nearest major road segment (defined as a road with an average daily truck count $\geq$ 1000). Exposure will be dichotomized as exposed or unexposed to moving traffic if this distance is less than or greater than 300 m, respectively. As an alternative approach, the distance will be categorized to three groups: < 300 m, 300-1000 m and >1000m. In addition, the shortest distance to the nearest bus route or urban highway with stop/go traffic patterns will be determined and exposure will be dichotomized as exposed or unexposed to stop/go traffic based upon a calculated distance ($\leq$ / > 100 m) (Ryan et al., 2005). If an address is exposed to both moving and stop/go traffic, children will be classified as exposed to moving traffic. Homes located at distances greater than 100 m from the nearest bus route and more than 300 m from the nearest major road will be considered unexposed (Ryan et al., 2005).

The weighted road density (WRD) model will incorporate the complete road network (US Census TIGER files) in the vicinity of the subjects' homes and other locations. All roads in the US TIGER files are classified as A1 (primary roads, typically interstates, with limited access), A2 (primary major, non-interstate roads), or A3 (smaller, secondary roads, usually with more than two lanes). The length of each of these roads (L_i) within radii (r) of 50, 100, 150, 200, 300, and 400 m of each geocoded location will be calculated using ArcGIS. Each length of road will subsequently be weighted (W_i) to reflect its traffic volume. WRD for each radii and address will then be calculated as (Rose et al. 2009):

$$\text{WRD} = (\sum_{i=1}^{3} L_i W_i)/\pi r^2 \quad (1)$$

A priori weights will be assigned as follows: A1-10, A2 -5, A3-1. Additionally, an unweighted road density model will also be developed and compared to the WRD model. The weights assigned will be recalibrated based upon model validation as described below.

The results of the WRD model will be compared to sampled levels of elemental carbon, a marker of traffic combustion, which has been collected at more than 27 sampling sites in the greater Cincinnati area as part of the CCAAPS and CAIC studies (described in sections 2.3.3.1 and 2.3.3.2). The correlation between WRD, unweighted road density, and the proximity, on one hand, and EC, on the other, will be calculated.

Although simple proximity models may result in exposure misclassification, WRD models have been shown to be valid predictors of TRAP (Rose et al. 2009). It is important that WRD models do not require sampling data which are not fully available for the period study after 2006. Thus, the advantage of WRD models is their applicability throughout the study time period to multiple addresses and their semi-quantitative results allowing for the calculation of average and cumulative TRAP exposure

Specific Aim 2: *Determine child-specific average and cumulative aeroallergen exposure levels from birth through age seven, combining currently available and newly obtained exposure levels to incorporate change of residence into the exposure estimates.*

Most aeroallergen exposure data are available through the CCAAPS and the HUD-CCAAPS projects. Dust samples collected from the HUD-CCAAPS cohort of 176 children at approximate ages one and seven have already been analyzed for ERMI, endotoxin, (1-3)-β-D-glucan, and cat, dog, house dust mite and cockroach allergens. Among the 176 homes, 140 homes have at least one additional dust sample, collected at ages 2-4. These samples have already been analyzed for cat, dog, house dust mite and cockroach allergens, but not for ERMI, endotoxin, (1-3)-β-D-glucan. Collected dust samples are stored frozen and will be available for further analysis. For these 140 homes, we plan to analyze one dust sample per home for ERMI, endotoxin, (1-3)-β-D-glucan. Analyses will be performed following the same protocols as were previously used in the HUD-CCAAPS (Reponen et al., 2010).

About 60% of the children in the CCAAPS cohort have moved at least once during the seven-year follow-up. The time spent at different addresses will be obtained from address history available through the CCAAPS.

For each aeroallergen the *average exposure level at age seven* will be calculated as a time-weighted summation of all available exposure levels between birth and age seven.

Cumulative aeroallergen exposure at age seven and interim time points will be calculated by summing the areas-under–the curve (AUC) of linearly interpolated exposure levels, incorporating change of residence into intervals of interpolation. The trapezoidal rule will be applied to calculate the AUC for each interval from birth to age seven.

Specific Aim 3: *Perform multiple logistic and linear regression analyses to assess the synergistic effects of aeroallergen exposures and traffic-related air pollution on asthma, allergic asthma, allergen sensitization, and eNO.*

The clinical data for health outcomes at age seven will be available through CCAAPS at no cost to the proposed project. The clinical data collected to be utilized for this study include the following: sensitization to aeroallergens, exhaled nitric oxide (eNO), asthma and allergic asthma. Sensitization to aeroallergens is assessed by skin prick test (SPT) for 15 aeroallergens (Meadow grass, Timothy grass, White Oak, Maple Mix, American Elm, Red Cedar, Short Ragweed, *Alternaria, Aspergillus fumigatus*, *Penicillium* mix, *Cladosporium*, cat, dog, German cockroach, and house dust mite). Children who show a positive reaction (> 3 mm wheel, greater than saline control) to any of the listed antigens are classified as sensitized. At the age seven clinical visit eNO, spirometry (all children) and methacholine challenge testing (on a small subset of the cohort to confirm asthma diagnosis) were performed on all enrolled children in order to aid in the diagnosis of asthma. Results on the eNO will be used as a primary indicator of lower airway

inflammation. Exhaled NO reflects airway eosinophilic inflammation and is especially amenable to use in children because of ease of measurement (Baraldi et al., 1999). The asthma diagnosis involved several steps. Participating children received spirometry according to ATS standards by trained technicians. Spirometry included forced expiratory volume in one second (FEV1) and Forced Vital Capacity (FVC). A subset of children were eligible for further lung function testing if they were reported to have asthma symptoms, or if their eNO > 10 ppb, or if their predicted FEV1 < 90% and/or FEV1/FVC < LLN (lower limit of normal). Eligible children were administered 2.5 mg of Xoponex by nebulizer by trained personnel followed in 15 minutes by repeat spirometry. Those with ≤12% increase in predicted FEV1 following bronchodilators or a normal baseline FEV1 and FEV1/FVC were administered a MCCT at a repeat visit. Children were defined as asthmatic if they fulfilled both of the following criteria: 1) Caregiver report of asthma symptoms and 2) Demonstration of airway reversibility or positive methacholine challenge test (MCCT). Asthma symptoms including at least one caregiver report of: 1) A tight or clogged chest or throat in the past 12 months, 2) Difficulty breathing or wheezy after exercise, 3) Wheezing or whistling in the chest in the previous 12 months, or 4) A previous doctor-diagnosis of asthma. Allergic asthma was defined as having a positive diagnosis of asthma and a positive SPT to at least one allergen.

The statistical analyses will relate levels of aeroallergen exposures and traffic-related air pollution. Multiple logistic regressions will be performed to evaluate the individual and combined effects of average and cumulative aeroallergen and air pollution exposures measured at the same age on asthma, allergic asthma, and SPT positivity (at last one positive, and at least two positive tests). Similar multiple linear regressions of eNO will be performed. Additional analyses will use finite mixture models to examine whether the synergistic effects of traffic-related exposure and aeroallergens at each age (one and seven) vary by socio-economic characteristics (e.g. family income, smoking status, and health insurance) or latent individual traits (race, gender, parental asthma). Interactions between average and cumulative exposures at age seven, and average exposures at age one will also be analyzed.

3.1.3 Power calculation

Backgound: The effect of co-exposure to high traffic-related exposure at age one and higher levels of endotoxin at age one were found to increase the odds of persistent wheezing at age three in the CCAAPS cohort (Ryan et al., 2009).

Synergism between endotoxin and traffic related air pollution: A preliminary analysis of 176 HUD-CCAAPS children included in the proposed study demonstrated a synergistic effect of endotoxin on traffic-related air pollution with respect to allergic asthma at age seven. In this analysis, higher home endotoxin levels at age one increased the odds of allergic asthma at age seven, and this effect was enhanced when the level of traffic-related air pollution at age one was also high (p-value < 0.01). The estimated odds ratio of allergic asthma, which corresponds to a +1 sd increase in log-transformed endotoxin, increased from OR=1.17 to 1.22 when traffic-related exposure was high.

Increased power of multiple aeroallergen measurements and detection of synergism between aeroallergen and traffic-related air pollution: Study power and synergism between traffic-related air pollution are described below with respect to the ability to predict allergic asthma at child age seven from multiple aeroallergen measurements. Preliminary data of levels of house dust mite aeroallergen is an example of the increase in power to predict allergic asthma at age seven from multiple samples and to detect an increase in that effect when traffic-related air

pollution at age one is included in the model. This applies to the cohort of 176 children. The effect of dust mite at age one was found by logistic regression to be protective of allergic asthma at age seven; however, the association was not significant (p=0.58) (preliminary, unpublished data). When year one *and a subsample of 122 year two dust mite levels* were included in the model, however, the association between dust mite and allergic asthma at year seven was protective and highly significant ($p<0.01$). In addition, a synergistic effect between up to two dust mite measurements and traffic-related air pollution at age one was found ($p< 0.001$). In this model, dust mite remained protective ($p<0.01$) and air pollution increased the risk of asthma ($p<0.01$). The above example shows that we will have sufficient power to detect synergistic effect of exposure to aeroallergens and TRAP in the cohort of 176 children.

3.1.4 Data Management and analysis

Data management: The CCAAPS currently has an extensive database tracking system. It utilizes an integrated, coordinated approach that documents all contact with the families including residential address and phone number history, questionnaire completions, scheduled appointments, dust allergen levels, receipt of results etc. As part of this database system a contact log tracks addresses, names, phone numbers and status, and is gathered after every attempted or completed communication. All written information regarding the subjects or their home characteristics is kept confidential, preserved and stored in file cabinets in the project office.

Home walkthrough was recorded on questionnaires developed using TeleForm (Cardiff, Vista, CA) software. The walkthrough data have been directly scanned and verified within the program allowing for immediate processing and entry into the databases. Raw data on microscopic spore counts was first recorded on sample analysis sheets, and then entered manually into a database, which includes software for calculation of the final concentrations for total count and different mold types. MQPCR-mold, endotoxin, (1-3)-β-*D*-glucan, fungal antigen data are obtained in electronic format from the respective software that processes the analysis results. Databases for all environmental exposure factors are already developed. Health outcome data obtained during the clinical visits have also been collected using web-based TeleForm software allowing for direct entry into the central database from remote clinic locations. Data requiring manual entry was double-entered and discrepancies between the double-entries were checked from the original hard copies.

Statistical data analysis will be performed using the Statistical Analysis System (SAS) version 9.2 (SAS institute Inc., Cary, NC, USA). A 5% significance level will be used as the threshold of statistical significance for hypothesis testing. Our analysis tool to estimate all proposed models is a regression model where the dependent variable is a health outcome expressed as a function of traffic-related air pollution and aeroallergen exposure variables. The measurement of outcomes will take a number of alternative forms. Binomial outcomes include asthma, allergic asthma and SPT positivity. We will first estimate models of continuous eNO. We will also estimate models of eNO based on a dichotomization of eNO levels, determined to be a meaningful clinical threshold. Tobit regression will be used to model continuous eNO, as it is left-censored and approximates a censored-lognormal distribution. Logit models will be used for analyzing dichotomized eNO, asthma, allergic asthma, and SPT positivity. In the case of an integer-valued outcome, number of positive SPT tests, Poisson or Negative Binomal regressions will be used. In the equation below, H_i is the health outcome for child i, and P_{ij} is air pollution exposure of subject i and A_{ij} is aeroallergen exposure at age j, both observed at age j.

$$H_i=f(P_{ij}, A_{ij}) \quad (2)$$

To test for synergistic effects of air pollution and exposure, the next equation augments the specification of the above equation with interactions of air pollution and aeroallergen exposure.

$$H_i=f(P_{ij}, A_{ij}, P_{ij} \times A_{ij}) \quad (3)$$

If coefficients of interactions are significantly different from zero, there is evidence of a synergistic association between air pollution and aeroallergen exposure.

Traditional statistical analyses cannot account for heterogeneity in the effects of exposures due to unobservable, or 'latent' individual traits. Therefore, we will apply finite mixture models (FMM) to estimate the effects of TRAP combined with aeroallergen exposures on health outcomes for groups of subjects whose responses are different from the average across all subjects. For example, subjects may have individual traits, determined by categories of parental asthma (yes, no), gender (male, female), and race (AA, other), that make them more susceptible to asthma due to levels of the three independent variables. To the extent that such heterogeneity can be categorized, finite mixture models can identify separate exposure effects for subjects in specific combinations of these categorical variables. The choice of the number of components in the mixture determines the number of 'types'. To describe the finite mixture model more formally, consider the basic regression specification for an outcome:

$$H_i=f(P_{ij}, A_{ij}; \theta) \quad (4)$$

Note that θ is the set of regression coefficients associated with the predictors of the health outcome. In the finite mixture model, the random variable H_i is postulated to be a draw from a population which is an additive mixture if C distinct classes in proportions π_c such that

$$g(H_i| \theta) = \Sigma \pi_c \ f_c(H_i \mid \theta_c), \ 0 \leq \pi_c \leq 1, \ \Sigma\pi_c = 1, \quad (5)$$

where the c^{th} density is $f_c(H_i \mid \theta_c)$, c=1,…C and θ_c is the associated set of parameters. The density f in each class is the same as the outcome. Once the parameters of a finite mixture model are estimated, individual observations can be classified according to their 'latent' types. To achieve this, the posterior probabilities of being in each 'latent' class are first calculated for each individual. For each observation, class membership is assigned on the basis of the maximum of the posterior probabilities. Once class membership is assigned, the description of the 'latent' characteristics of each class may be described.

The statistical distributions of the new ERMI, endotoxin, and (1-3)-β-D-glucan data will be inspected for outliers and the normality of these distributions will be tested. A transformation (e.g., the logarithmic transformation) will be applied to normalize the data, if required. Before performing statistical tests, the data will first be examined by taking distributions of the variables, and plotting all variables for visual inspection.

3.1.5 Timeline and community involvement

The study will take two years. It is clearly feasible to complete the study in the proposed timeline because we already have the IRB approval and most of the data are already available and cleaned. The detailed timeline is presented in Table 2 in section 3.4.

The CCAAPS families are invited in an annual picnic in the Cincinnati Zoo. At this community outreach event, the main findings of the study will be highlighted and the families will have the opportunity to ask study-related questions from the investigators. Families also receive yearly newsletters, holiday cards, and can get updates of the study at the CCAAPS web-site (http://eh.uc.edu/ccaaps/). Materials on healthy housing (available from HUD) will also be disseminated.

3.2 Policy Priorities

The FY2010 HUD policy priorities are addressed in this application are the following:

Priority (1) *Capacity Building and Knowledge Sharing* is addressed through the following activities:

Activity 1: Integration of research findings with other researchers and practitioners in the healthy homes field. Travel for two people has been budgeted to participate and present in the HUD grantee or HUD Healthy Homes meetings. We have ongoing collaboration with the Cincinnati Health Department regarding traffic pollution (see 2.3.3) and will expand this collaboration to indoor air contaminants (see support letter in Appendix 2).
Measure of success: Develop a new partnership with the Cincinnati Health Department related to healthy homes. This is expected to lead to joined research efforts with the Health Department.

Activity 2: Presentation of research findings at academic and /or professional conferences. One trip for a national conference per year has been budgeted, but the results of the proposed study will be presented at a greater number of forums to research and policy making communities. The PI and co-investigators frequently attend and present at major related national and international conferences (e.g., American Industrial Hygiene Conference and Exposition, American Association for Aerosol Research, Indoor Air, Healthy Buildings, Annual Conference of the American Thoracic Society, Annual Conference of the American Association of Asthma, Allergy and Immunology). The key investigators will likely be funded (or partially funded) by other agencies to participate at these conferences, which increases the cost effectiveness of the proposed project.
Measure of success: Present results annually in at least one national conference. Publish research findings in at least two peer-reviewed articles.

Priority (2) *Using Housing as a Platform for Improving Other Outcomes* is addressed through the following activity:

Activity: Coordination and information sharing with the Cincinnati Health Department, which is expected to result in improved health outcomes in the populations in greater Cincinnati area.
Measure of success: Results will be shared with the representatives of Cincinnati Health Department and will be used in the future collaboration aiming at the development of protocols for assessing housing-related health hazards by health departments. The results will also be used in developing local guidelines for interventions and for interpreting data on home assessments.

3.3 Quality Assurance Mechanisms. Quality Control Issues. Human Subjects

Most of the QA/QC issues described below pertain to the activities that occurred during the home sampling and analysis in the CCAAPS and HUD-CCAAPS projects. During the home walkthrough and environmental sampling, checklists were used for characterizing the homes and the study areas and for subjective observation during sampling. Standard operating procedures were written for all routine activities having an effect on data quality. When measuring airborne

mold, the sampling flow rate of the air samplers were checked with a calibrated flow rate meter at the beginning and at the end of each measurement period. The measurement results were accepted if the difference between the flow rate values does not exceed 5%. The air sampling pumps were sent for maintenance annually.

Field blanks and trip blanks were collected for all types of samples in 5% of homes. Duplicate sampling was also conducted in 5% of homes. Duplicate analysis was conducted for 5% of samples. Altogether nine quality control samples [5% of the number of dust samples (176)] provided by the OHHLHC were analyzed for indoor allergens (house dust mite, cat, dog, and cockroach) as required by HUD. The dust and air samples were transferred to the laboratory in a cooler box with ice and stored at -20°C until analyzed. The laboratory did not know which ones are real and which ones are QC samples. When performing microscopic spore counting for the filter samples at least 40 randomly selected microscopic fields or 400 spores were counted. Pyrogren-free tubes, pipet-tips, and glassware as well as medium blanks were used for (1-3)-β-D-glucan and endotoxin analyses. For allergens analysis with ELISAs, 2 media blanks are included on each microtiter plate, and a standard curve of purified allergen is included on each plate as well. The sampling and analysis methods used for the study have been validated in the laboratory and field. The QA-QC issues related to data management and data analysis are described above in section 3.1.3.3.

Training session for staff was organized annually during the indoor sampling campaigns. In addition to training on the sampling protocols and use of sampling equipment, the communication and safety issues were addressed. Special consideration was given to have an adequate understanding when working with people with disabilities as well as with families that have limited English proficiency or primary languages other than English (the UC team has staff members and graduate assistants fluent in Spanish and several Asian languages).

As specified in the HUD Healthy Homes Initiative RFA, if the application is funded, the applicant will submit a detail QA/QC Plan to HUD prior to the project initiation. The above section serves as a general description of our plans related to the QA/QC and human subject issues. Dr. Reponen will be responsible to oversee the drafting and compliance of the Quality Assurance plan.

The protocols for the CCAAPS and the HUD-CCAAPS have current IRB approvals. A modification request will be submitted to IRB to include the additional analysis proposed in this study.

3.4 Project Management Plan and Resources

The PI will be responsible for the overall project management and thus will insure that the research team focuses on the overall mission of this study and follows the research plan. The quarterly reports will be submitted to the HUD reflecting the work outlined in Section 3.1. The timeline presented in Table 2 will be thoroughly followed.

Table 2. The timeline for major milestones and benchmarks (it is assumed that the project will start on January 1, 2011; if the start date is delayed, the delivery dates will be delayed proportionally).

Major Milestones[1]	Major benchmarks	Delivery Date[2]
Establish and submit to HUD quality control and quality assurance procedures. Order supplies for sample analysis. Submit modification request to IRB.	QC/QA plan submitted to HUD; supplies ordered; IRB finalized	March 31, 2011
Determine child-specific average and cumulative exposure to traffic-related particles (TRAP) from birth	Data on TRAP exposures	October 31, 2011

through age		
Analyze archived dust samples for MQPCR-mold, (1-3)-β-D-glucan and endotoxin.	Complete data set on aeroallergen exposures from age one to age seven	October 31, 2011
Prepare abstract on aeroallergen exposure data for the International Healthy Buildings conference (or the AIHCE)	First abstract submitted	December 31, 2011
Statistical data analysis on the association between the health outcomes and average vs. cumulative exposure to aeroallergens	Data analysis on exposure data completed	March 31, 2012
Prepare a scientific manuscript for a major *peer-reviewed* journal based on results on the association between the health outcomes and average vs. cumulative exposure to aeroallergens (Paper 1; *Environmental Health Perspectives* or equivalent journal)	First peer-reviewed paper submitted	June 30, 2012
Statistical data analysis on the synergistic effect of exposure to aeroallergens and TRAP	Data analysis on synergistic effect completed	September 30, 2012
Prepare abstract on the synergistic effect for the AAAAI (or ATS) conference	Second abstract submitted	October 31, 2012
Prepare a scientific manuscript for a major *peer-reviewed* journal based on results on the synergistic effect of exposure to aeroallergens and TRAP (Paper 2; *Journal of Allergy and Clinical Immunology* or equivalent journal)	Second peer-reviewed paper submitted	December 31, 2012
Prepare Final Report	Final Report to HUD	March 31, 2013

Additionally, an update on the study progress will be presented in the annual HUD grantee's meeting. The management plan will be coordinated with short-term, intermediate, and long-term goals specified in the Logic Model (Appendix 3) and Organizational Chart (Appendix 4). The PI (Dr. Reponen) will lead the study design, data analysis and interpretation with the help from other co-investigators. Dr. Ryan will conduct the modeling to determine child-specific average and cumulative exposure to TRAP from birth through age seven. Dr. Levin will supervise all the statistical data analysis. Dr. Grinshpun will be in charge of the interpretation of TRAP data and Dr. Vesper will lead the effort to interpret aeroallergen data.

Project deliverables. A quarterly progress report and a final report will be submitted to HUD. Resulting from this study, at least two papers will be submitted to peer-reviewed academic journals. The findings will also be presented in two or more major national/international professional meetings. The PI will be responsible for submitting the papers to journals and conference proceedings. All the families participating in this study will receive the summary of findings through the annual newsletter and as a part of an outreach program (the annual picnic).

3.5 Affirmatively Furthering Fair Housing (AFFH) and Section 3 Requirements

The proposed project focuses on the analysis of existing data sets and therefore, AFFH is not applicable.

3.6 Budget Proposal

The total (2-year composite) budget (HUD424CBW_Budget_Worksheet.xlsm) is listed in Appendix 5 of this application and the Budget Justification is below and has been uploaded into the Budget Narrative Attachment Form of this application. The project objectives will be achieved with very low budget because the team will extensively use other resources that are available at no cost to the HUD grant due to existing birth cohort, as well as extensive collaborations and partnerships described in Section 4. The total requested amount for the 2-year period is $268,709 (direct plus indirect cost to HUD).

Budget Justification:

Personnel (at the University of Cincinnati)

[redacted] (PI) 1.2 calendar months will be responsible for overall performance and management of the study with 10% (Years 1-2) of her salary support from this project. She will in charge of interaction and coordination between all co-investigators, preparation of manuscripts and progress reports to HUD.

[redacted] (co-investigator) 0.6 calendar months will actively participate in the study design issues with a specific focus on the interpretation of data related to traffic-related air pollution. He will be funded at 5% (Years 1-2) of his salary from this project.

[redacted] (co-investigator) 1.2 calendar months is budgeted at 10% effort for Years 1-3. She will oversee all the statistical analyses of the data.

[redacted] (co-investigator) 2.4 calendar months is budgeted at 20% effort for Year 1-2. [redacted]. [redacted] will conduct the modeling to determine child-specific average and cumulative exposure to TRAP from birth through age seven. He will also contribute to the epidemiological aspects of the study design and data analysis.

[redacted] (Research Assistant) 2.4 calendar months is budgeted at 20% effort for Year 1. She will analyze the archived samples for endotoxin and (1-3)-β-D-glucan. [redacted] g (Research Associate) 3.36 calendar months is budgeted at 28% effort for Year 1-2. She will do the statistical data analysis.

Co-investigator participating at no cost to HUD:

[redacted] will oversee the analysis of archived dust samples for 36 mold species by the PCR and the calculation of ERMI and will participate in the interpretation of aeroallergen data.

Fringe Benefits:

Fringe Benefits are a direct charge as a percentage of salaries and wages at rates established by the University of Cincinnati and reviewed annually by DHHS.

Supplies and Materials:

This category includes supplies and analysis kits for the analysis of 140 samples for endotoxin and (1-3)-β-D-glucan in Year 1 (total $4,480):
5 Glucatell kits @$585/each = $2,925
10 Pyrochrome kits @$88/each = $880
Other reagents for assays (Glucashield, reagent water, endotoxin standard) = $325
Tubes and pipet tips = $350

Travel:

One trip to HUD for two investigators from the University of Cincinnati team is budgeted for each year (flight: 2 x $650; hotel 2 x $150; per diem 2 x $142; local travel $38 = $1,922/year). One trip to national professional conference is also budgeted for each year (flight: $800; hotel $910; registration $600; local travel $52 = $2,362/year).
Year-2 has incorporated a 3% increase for inflation.

FACTOR 4. Leveraging Resources

While the proposed project includes rather complex and labor-consuming epidemiological study, the budget requested from HUD is relatively modest for a multi-institutional effort of this scope. This is mainly due to the use of existing CCAAPS birth cohort and data available from the recently completed HUD-CCAAPS study. The estimated total value of leveraging is [redacted], as itemized below.

(4.1) The proposed study is intergraded into an existing CCAAPS project. Recruitment of birth cohort and obtaining clinical, environmental data for the age 1-7 for the children in this cohort has estimated cost of $[redacted] (see support letter in Appendix 2).

(4.2) Exposure data from a recently completed HUD-CCAAPS ($[redacted]) is available for the proposed project.

(4.3) Participation of [redacted] of US EPA – Cost estimate for EPA participation is 140 samples × $[redacted] per sample or $[redacted]. If we had to purchase this service through a commercial laboratory, the total cost for this project with overhead would be $[redacted] (see support letter in Appendix 2).

(4.3) As indicated in Sections 1.1 and 3.4, significant resources are already available in the laboratories of the UC, and US EPA. Their unique equipment and advanced research expertise will greatly benefit the proposed study, allowing us to perform it in a time- and cost-effective manner. Thus, no equipment is budgeted for this grant.

*Leveraged Resources: please see foot note on FormHUD96015.

FACTOR 5. Achieving Results and Program Evaluation

Major milestones and benchmarks of the proposed project are presented in Table 2 (Rating Factor 3) and in the logic model (Appendix 3). The major outcomes of the proposed project will be the answers to the following questions:

(a) What is the role of home exposure through years one and seven in the development or exacerbation of allergic disease? This will be answered in Paper 1.
(b) What is the synergistic effect of exposure to aeroallergens and traffic-related air pollution? This will be answered in Paper 2.

The data collection, analysis, archiving, and interpretation will be performed following the proposed research plan. The quality assurance and quality control issues will be addressed as described in Section 3.3. The findings will be evaluated by HUD based on the quarterly and final reports submitted according to the agency guidelines.

The most important performance indicator will be the submission of abstracts and manuscripts. The success of this effort will be ensured by the following:

(5.1) Most of the data is already available for the proposed study. The additional analysis of archived dust samples follows protocols that we have used previously in the CCAAPS project. Thus, no major delays are expected. The laboratory and field experience and the general technical and management expertise of the applicants will ensure the overall success of the project.
(5.2) The team will consult with HUD regularly on major steps of this research effort. The PI and other key investigators of this project have established a very productive relationship with HUD while performing several studies sponsored by this agency in the past and have published several papers co-authored by HUD collaborators. The grant progress assessment will be conducted quarterly using the HUD-developed performance evaluation strategy.
(5.3) The team has extensive experience in all aspects of the study, including the cohort maintenance, indoor sampling and analysis, data analysis and interpretation and QA/QC issues as described above.
(5.4) [redacted]r will include the newly-developed methodologies for mold assessment in their professional training courses. They frequently teach indoor air quality and mold related topics. This will make a wide range of professionals aware of the new method and protocol and help the implementation of this novel technique in the future.
(5.5) In addition to the regular reporting to the HUD, major findings and the database will be shared with EPA through [redacted]. Mutually beneficial interaction will be maintained with [redacted] HUD-funded project. Results will also be shared with the Cincinnati Health Department. It is expected that the data collected by other research institutions will be shared with the team.
(5.6) The data collected in this study will also be presented in at least two national or international conferences. At least two p*eer-reviewed* publications for major journals will be submitted.
(5.7) The major findings will be shared with residents through annual newsletter and in the annual meeting organized by CCAAPS for the participating families.

Potential problem in the proposed study is the high moving rate of the CCAAPS families. Estimation of the cumulative exposure will be challenging as about 60% of the children moved at least once during the seven-year follow-up. We believe that this will not become an obstacle for the successful and time-efficient execution of the proposed project because we have kept good records on the home addresses of each child. We will also compare the association between exposures and health effects between children who moved vs. those who did not move.

The investigators of the proposed effort have been extensively involved in the management and execution of several HUD-funded projects over the last ten years, all of which have been successfully completed. This includes the study for which Dr. Grinshpun (co-investigator) was awarded with the Best Practice Award from HUD (2000). Overall, about 20 peer-reviewed publications have resulted from the co-investigators' work sponsored by HUD. With this experience, enhanced by several free-of-charge partnerships, and having all the major equipment and facilities already available for the project, we are confident that all the goals of the grant will be achieved in a time- and cost-efficient manner.

References to the literature cited in this application are presented in Appendix 6. The study will benefit the population living in the Cincinnati Urban Round 2 Empowerment zone; Form 2990 is in Appendix 9.

Synergistic Effect of Home Exposure to Aeroallergens and Traffic-Related Air Pollution in the Development of Children's Asthma

Principal Investigator: [redacted], Dept. of Environmental Health, University of Cincinnati;
Co-investigators at the Dept. of Environmental Health, University of Cincinnati:
[redacted];
Co-investigator from US EPA National Exposure Research Laboratory: [redacted]

Summary of the objectives

Most of the previous asthma studies have investigated one type of exposure at a time and have not included the combined effect of indoor and outdoor air pollutants. The main objective of this study is to assess the synergistic effect of exposure to aeroallergens and traffic-related air pollution on the development of asthma and allergic disease in children.

Hypothesis: The association between aeroallergen exposure and the development of asthma in children at age seven is modified by exposure to traffic-related air pollution (TRAP).

Specific Aim 1: Determine child-specific average and cumulative exposure to TRAP from birth through age seven utilizing geographic information system-based models and address history.

Specific Aim 2: Determine child-specific average and cumulative aeroallergen exposure levels from birth through age seven, combining currently available and newly obtained exposure levels to incorporate change of residence into the exposure estimates.

Specific Aim 3: Perform multiple logistic and linear regression analyses to assess the synergistic effects of aeroallergen exposures and traffic-related air pollution on asthma, allergic asthma, allergen sensitization, and eNO.

Study design

The study has strong foundation on an existing birth-cohort study, Cincinnati Childhood Allergy and Air Pollution Study (CCAAPS), which includes 762 children in the Greater Cincinnati metropolitan area. A subgroup of 176 children from this cohort recently participated in a HUD-funded study that focused on investigating the association between mold exposure (as assessed by multiple methods) and the development of asthma and allergic disease in children. Children's address history, results on indoor aeroallergen exposures at ages one and seven and the results on health evaluations at age seven are available for the proposed study. Additional sample analysis of 140 archived dust samples (collected at ages 2-4) is proposed in order to more accurately estimate the cumulative aeroallergen exposure for each child.

The study will include results on aeroallergen exposure measured by two newly developed concepts for the evaluation of moldy buildings: 1) the Environmental Relative Moldiness Index (ERMI) based on data analyzed by the Mold Specific Quantitative Polymerase Chain Reaction (MQPCR) assay and 2) the fungal fragment sampling (in combination of two newly-developed assay methods). The aeroallergen exposure data also includes concentrations of cat, dog, house dust mite, and cockroach allergens as well as endotoxin and (1-3)-β-D-glucan. For each aeroallergen the *average exposure level at age seven* will be calculated as a time-weighted summation of all available exposure levels between birth and age seven.

Cumulative aeroallergen exposure at age seven and interim time points will be calculated by summing the areas-under–the curve (AUC) of linearly interpolated exposure levels, incorporating change of residence into intervals of interpolation. To estimate the child-specific average and cumulative traffic exposure, weighted road density models using geographic

information systems (GIS) will be developed and validated. The health outcomes of interest are allergen sensitization assessed by the skin prick test (SPT), exhaled nitic oxide (eNO) as a marker of eosinophilic airway inflammation and asthma. The statistical analyses will relate levels of aeroallergen exposures and traffic-related air pollution. Multiple logistic regressions will be performed to evaluate the individual and combined effects of average and cumulative aeroallergen and air pollution exposures measured at the same age on asthma, allergic asthma, and SPT positivity.

The proposed team of investigators is uniquely positioned to perform the proposed study in a very cost effective manner, due to using an existing birth cohort study CCAAPS. With funding from HUD we will be able to piggy back on the previously collected cleaned data. The estimated total value of leveraging is $9.5 million.

Expected results

The major research questions to be answered in this study are:

1) What is the role of home exposure through years one and seven in the development or exacerbation of allergic disease?

2) What is the synergistic effect of exposure to aeroallergens and traffic-related air pollution?

Knowledge on how the different types of exposures are associated with the health outcomes will help in selecting the most cost-efficient method for assessing the most relevant indoor air hazards. Information on the interaction between traffic-related exposures and indoor aeroallergens are important for urban planners in regards of locations of home and school vs. highways. We are planning to use the data generated in the proposed study in the future collaboration with the Cincinnati Health Department.

This study will have significant public health impact as it will generate unique new insights that will help understanding the health effects related to environmental exposures in homes and lead to improved early prediction, cost-effective testing and diagnosis of disease, which will ultimately reduce morbidity and mortality. The results will also be useful in selecting the most cost-efficient methods for assessing housing related hazards.

Budget Narrative File(s)

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