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The effect of window repairs and window replacement on lead dust levels

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BOSTON UNIVERSITY

SCHOOL OF MEDICINE

Thesis

**THE EFFECT OF WINDOW REPAIRS AND WINDOW
REPLACEMENT ON LEAD DUST LEVELS**

by

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B.A., New York University 2011

Submitted in partial fulfillment of the

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Master of Arts

2013

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ABSTRACT

BACKGROUND: Lead dust in homes is the primary route of lead ingestion for children. More and more evidence concludes that levels of lead $<10 \mu\text{g}/\text{dl}$, which once was thought to be safe, can cause permanent neurological effects and damage. Lead exposure and toxicity is hard to treat because of the negative side effects of the chelating agents. The focus should be on prevention.

OBJECTIVE: Our objective was to conduct a study to see if window replacements and/or window repairs will significantly decrease the lead levels in low income housing homes. This study is collaboration between HUD, weatherization groups, and public health departments.

DESIGN/METHODS: We performed statistical analyses of lead loading result data that was collected on the field. Compared the lead loading results for each sample location in each unit before and after window repair (Cohort 2), window replacement (Cohort 1), and no treatment for the control group (Cohort 3). The analyses were completed using a

two sample matched pair z test and a significance level of 0.05. The control group was used to measure variance and to see if the difference is statistically significant.

RESULTS: There appears to be a statistically significant reduction in the mean loading results in the Window Repair Cohort 2 across both Phase 1 to 2 ($z=-2.63$) and Phase 1 to 3 ($z= -3.10$). There was not a statistically significant reduction in the mean loading result of the samples in the Window Replacement Cohort 1 across Phase 1 to 3 ($z=-1.3$), and there surprisingly appears to be an increase in mean loading result of the samples across Phase 1 to Phase 2 ($z= 1.65$). There was a significant decrease in loading results throughout Phase 1 to 2 and Phase 1 to 3 for the Control Group Cohort 3.

CONCLUSIONS: There is sufficient evidence to suggest that window repair will decrease lead dust levels in homes. According to our preliminary results window replacement decreases the average lead loading results by 43.6%, while window repairs decreased the average lead loading result by 97.4%. While this supports our hypothesis, the increase in lead loading results after a short time window replacement is unexpected. Further studies should be implemented to prevent high lead levels directly after weatherization and provide regulations.

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ABBREVIATIONS

ADHD	Attention Deficit Hyperactivity Disorder
BI	Behavioral Index
BLL	Blood Lead Level
CDC	Centers for Disease Control and Prevention
FSIQ	Full-Scale IQ
HI	Hyperactivity Index
HUD	Department of Housing and Urban Development
LIHEAP	Low Income Home Energy Assistance Program
NHANES	National Health and Nutrition Examination Survey
OI	Oppositional Index
Pb	Lead
PIQ	Performance IQ
VIQ	Verbal IQ
WAP	Weatherization Assistance Program

INTRODUCTION

Lead exposure is still a substantial public health issue even though policies and practices have resulted in continued progress in decreasing lead exposure and lowering blood lead levels (BLL) in the U.S. population. Childhood lead exposure remains one of the most harmful and persistent child environmental health problems in the USA (1).

Lead Sources:

Lead (Pb) is a natural element. However its existence in the blood is a result of industrial man-made activities. The two major sources of lead are in the air- coming from gasoline combustion, which contains tetraethyl lead and lead in dust made from lead paint. Lead in plumbing can also contaminate drinking water. Some uncommon sources of exposure are cosmetics and folk remedies (2). In 1977 the US Consumer Product Safety Commission prohibited the sale of lead paints (3). Since then, there has been a reduction in mortality from lead poisoning in childhood (4).

Lead Absorption:

Lead enters a body through inhalation or ingestion. Severe lead poisoning is often caused by the ingestion of lead paint chips, however the more common exposure is from lead polluted dust (5). Absorption of lead is inversely related to

particle size (6). Nutrition is important because diets high in iron and calcium and low in fat can help reduce the rate that lead is absorbed (7). Contaminated dust is ingested by young children through hand-to-mouth activities as they play on the floor and crawl around. The ingested lead travels through the blood to the brain, where it causes neurological damage. The half-life of lead is approximately a month in blood, one to one and a half months in the soft tissue, and 25-30 years in bone (8).

Lead in Homes:

Levels of lead in settled house dust is the primary source of exposure for most children today (9). Approximately 38 million homes still have lead-based paint and 24 million homes have paint hazards from deteriorated paint and infected dust and soil (5). Lead paint was banned in 1978, and therefore is common in houses built before 1960 (10). Windows have the highest levels of lead paint and lead contaminated dust compared with other building components (5). Homes that are of high risk should be the focus of Pb exposure reduction. These homes can be determined by wipe testing for lead in dust (11). The interior dust lead amount is an important predictor of blood lead level (12).

Methods of lead removal:

The process of deleading, especially when not done properly, can create a significant source of lead. Particles of lead can be released into dust, which can

be inhaled or ingested. If furniture and carpeting are not covered, then particles can infiltrate fabric and carpet in a way that they become a source of lead (13). During the deleading process, tenants have to vacate the residence because lead levels increase right after abatements because the process is disruptive to lead paint causing increased lead dust. Non-compliance among tenants in these situations can lead to lead poisoning (14).

Window Replacements and Repairs:

Windows are most likely to contain lead paint and high levels of lead dust (9). Lead paint was banned after 1978, while in the 1980's double-pane windows became very common. As a result, single-pane windows in old houses are a dependable indicator of lead paint hazards because double-pane windows in older homes are a sign that the original single-pane, lead-based windows have already been replaced (15).

Lead hazard reduction can be accomplished through the removal lead dust and stabilization of deteriorated lead paint- i.e window replacement and window repair. Urgency for intervention is determined by housing inspections that test the lead content of deteriorated paint and paint on friction surfaces such as windows, doors, and floors, and test for lead in dust. Research has shown that measurement of lead dust levels are directly correlated with children's blood lead level (11). Repair work, such as abatement, disturbs the lead paint and without

proper cleanup can cause dangerous lead dust levels in the short run. A recent study showed that weatherization can potentially create large amounts of lead dust that if not properly cleaned up, can place children at risk (16).

Window repairs can lead to important energy and health benefits, because these repairs result in more air-tight window systems and all deteriorated lead paint is either removed, enclosed or stabilized. Window repairs include caulking, and scraping friction surfaces and assuring that paint on windows is smooth and not chipping or peeling. The WAP, or Weatherization Assistance Program, discovered that residents of properly weatherized homes reported a decreased incidence of colds, allergies, headaches, and nausea. These health benefits may be related to the improved temperature consistency from weatherization. Leaky air ducts decrease energy efficiency and can cause moisture problems, which are associated illnesses caused by mold and indoor air pollution. Densely packed wall insulation that reduces excess air infiltration can benefit health by reducing excess moisture infiltration, reducing allergens related to cockroaches and other insects that live in empty wall cavities (17).

Research that examined new homes built with energy efficient windows found significant improvements in throat irritation, cough, fatigue, and irritability (18). Another study demonstrated that the insulation of existing houses causes a warmer and drier indoor environment. This results in improved health, reduction in wheezing, a decrease in days of school and work missed, and fewer visits to

general physicians and overall hospital admissions from respiratory conditions (19).

Lead Prevalence:

During the past 40 years, studies continue to discover evidence of negative health effects at consistently lower and lower blood lead levels. As a result, the Centers for Disease Control and Prevention (CDC) has frequently lowered the concentration for elevated blood lead level in children, as shown in Table 1 to the current level of 10 $\mu\text{g}/\text{dL}$ (20).

Table 1: CDC Action Levels for Lead. Table taken from Gilbert et al., 2006

Year	CDC Action Level for Lead
1960s	60 $\mu\text{g}/\text{dl}$
1975	30 $\mu\text{g}/\text{dl}$
1985	25 $\mu\text{g}/\text{dl}$
1991	10 $\mu\text{g}/\text{dl}$

The blood lead levels for US Preschoolers decreased from the National Health and Nutrition Examination Survey II (NHANES II) to the NHANES III. This is largely because of regulations that removed lead from gasoline and paint (15). A report that looked at the NHANES III blood lead in 1988-1991 stated that lead paint hazards in older homes were the greatest childhood risk for lead exposure (21). The replacement of single-pane windows and demolition of old buildings

accounts for a significant part of the reduction in childhood lead exposure during the 1990s (22) but there are still around 310,000 children in the United States with blood lead levels above 10 $\mu\text{g}/\text{dL}$ and 7.4% of children have blood lead levels above 5 $\mu\text{g}/\text{dL}$ (23).

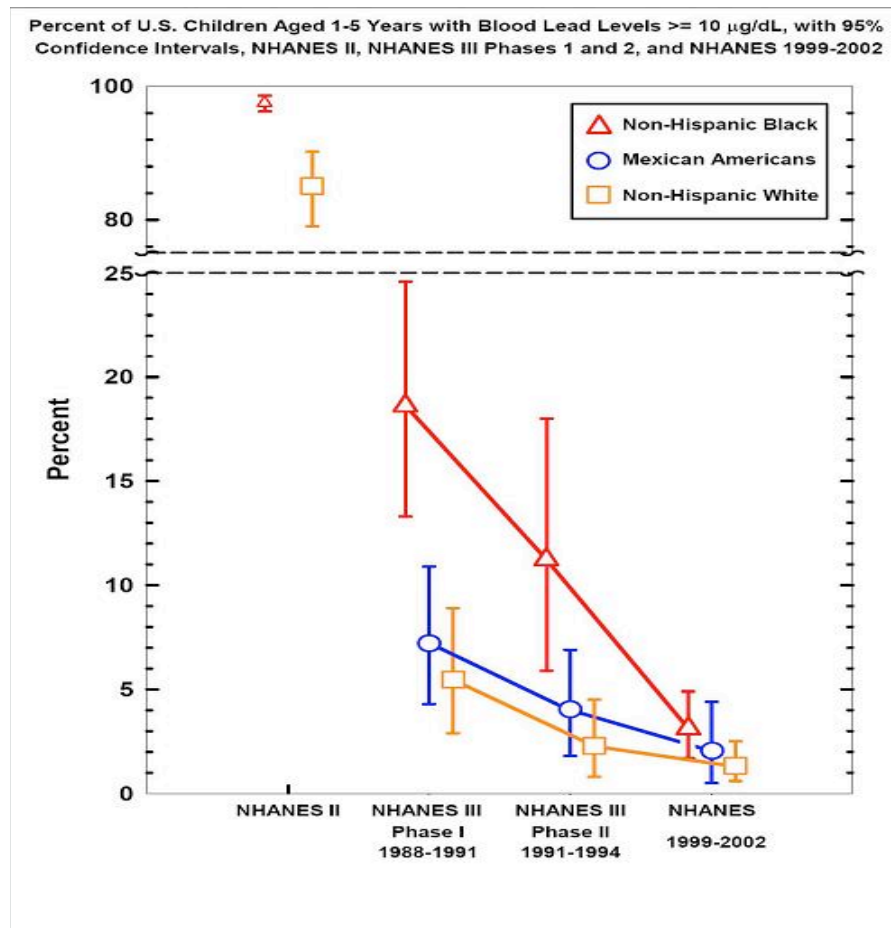


Figure 1: Percent of U.S. Children Aged 1-5 Years with Blood Lead Levels Greater Than or Equal to 10 $\mu\text{g}/\text{dL}$. Figure taken from Jones et al. 2009

Figure 1 demonstrates that the percent of U.S. children between the ages of 1 and 5 with a BLL of greater than or equal to 10 $\mu\text{g}/\text{dL}$ has decreased.

However minority children, such as African American and Mexican American children, are disproportionately affected by lead paint hazards (24).

Effects of Lead:

It is well understood and accepted that lead exposure is related to a plethora of adverse health effects (25). Research shows that early lead exposure strongly increases the risk of educational failure and criminal behavior later on in life. Ingested lead travels through the circulatory system to the child’s brain, where it can cause neurological damage. We can see that lead toxicity is correlated with decreases in observed SAT scores that are tested later in life (Figure 2). This trend is also seen in Figure 3 through the positive correlation between blood lead levels in children and public school mental retardation 12 years later.

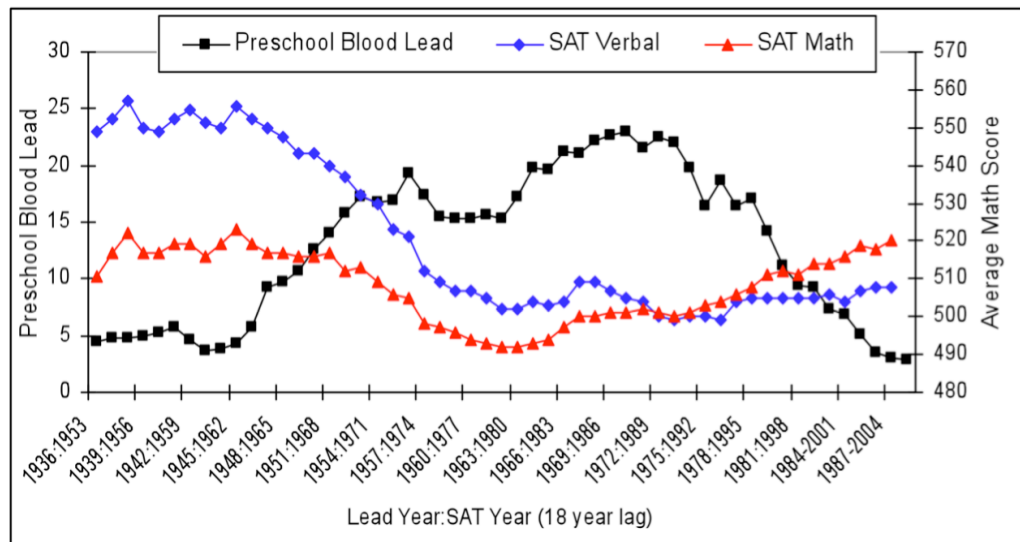


Figure 2: US Trends in Preschool Blood Lead and SAT Scores. Figure taken from Nevin, 2009

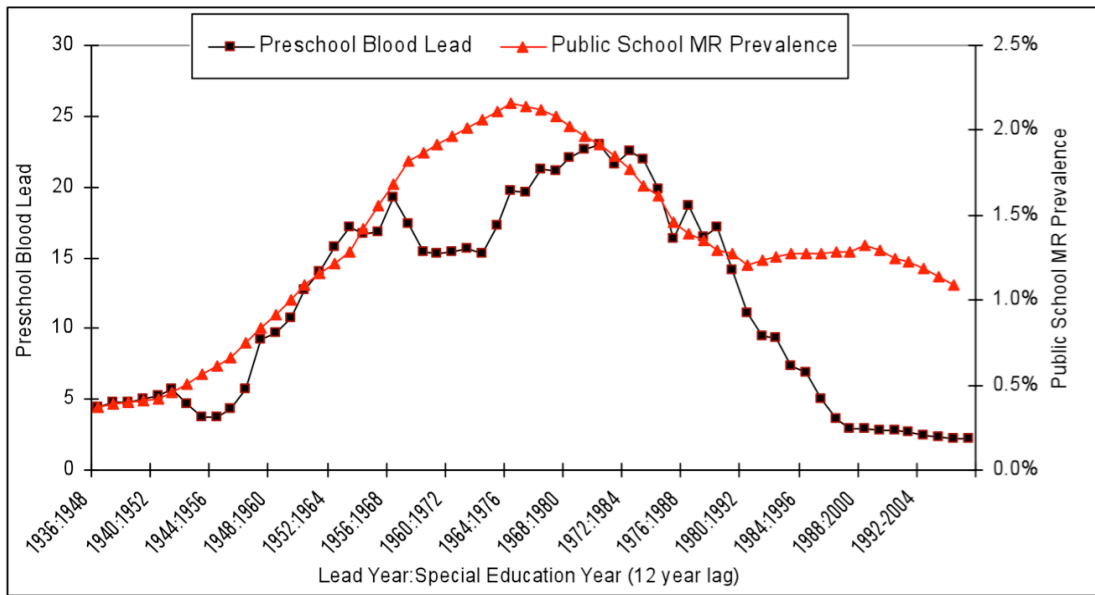
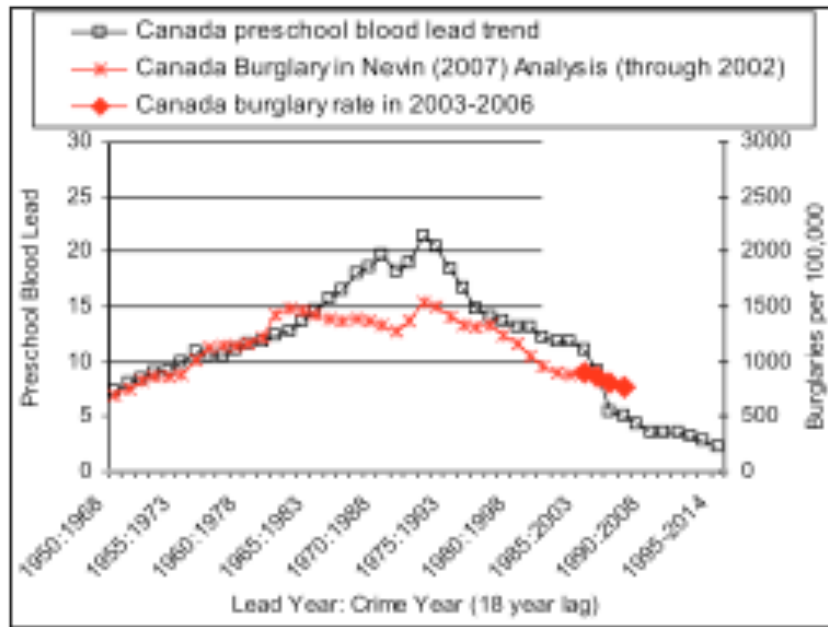


Figure 3: US Trends in Preschool Blood Lead and Mental Retardation.
 Figure taken from Nevin, 2009

There are also effects on hearing and balance. Teachers report that students with elevated blood lead levels are more inattentive, hyperactive, and disorganized. Elevated BLLs are also associated with attentional dysfunction, aggression and delinquency (26). As can be seen in Figure 4, there is a striking association between BLLs and burglary in studies completed in Canada, Australia and Great Britain.

A



B

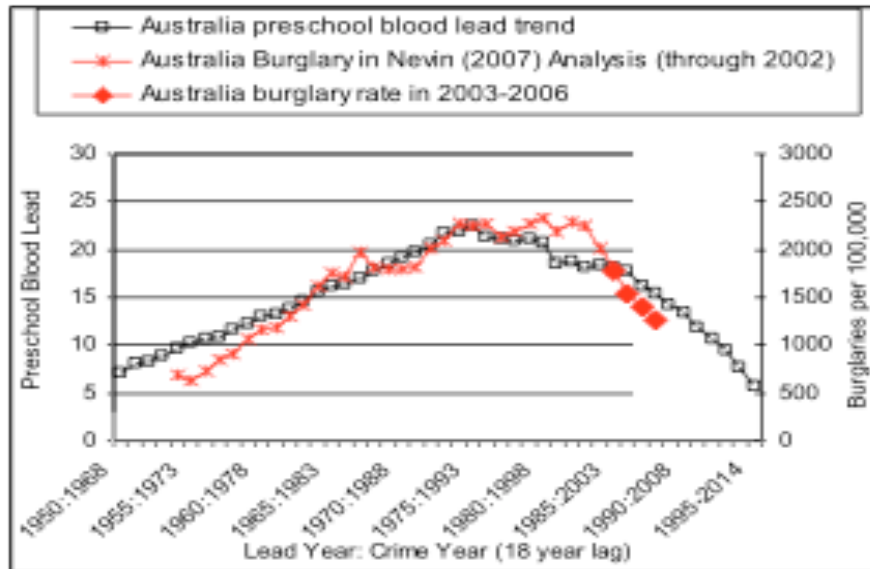


Figure 4: International Trends in Blood Lead and Burglary between 2003-2006. Shown are data from Canada (A) and Australia (B). Figure taken from Nevin, 2007

C

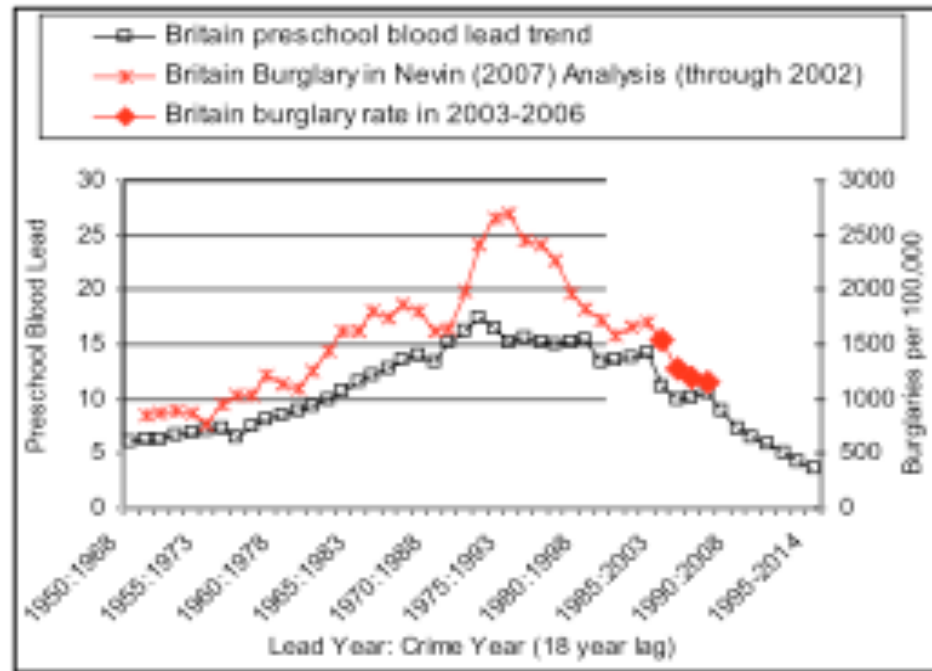


Figure 4 continued: International Trends in Blood Lead and Burglary between 2003-2006. Shown is data from Britain (C). Figure taken from Nevin, 2007

Lead also affects children by impairing the 1-d-hydroxylation of vitamin D which is necessary to activate the vitamin (2). Lead also interferes with heme synthesis at blood levels of 25 µg/dl and higher. Two enzymes that close the heme ring, D-aminolevulinatase and ferrochelatase, are both inhibited by high lead blood levels. In addition, children with blood lead levels higher than 60 µg/dl may exhibit abdominal pain, loss of appetite, headaches, or constipation. Higher lead levels can lead to encephalopathy that results in seizures, hearing loss, and even death (2).

Effects of Lead < 10µg/dL:

There is extensive evidence that low-level Pb exposure, blood Pb levels <10µg/dL, can cause adverse health effects (2). In children, there is evidence that blood lead levels <5µg/dL are associated with attention deficit hyperactivity disorder (ADHD), an increased occurrence of difficult behaviors, and decreased cognitive performance. The CDC recognizes a causal relationship because lead levels of <5 µg/dl and these problems. Evidence also suggests that blood lead levels <10µg/dL in children are correlated with delayed puberty, reduced postnatal growth, decreased kidney function, and decreased cognitive performance (2).

In adults, low lead levels are correlated with with decreased renal function increased blood pressure, hypertension, and increased cardiovascular-related death. Maternal blood Pb level is correlated with decreased fetal growth, increased fetal death and preterm birth (2).

Treating Lead Toxicity:

The absorption and biological fate of lead are affected by a variety of factors such as an individual's nutrition, health and age. Lead toxicity >40 µg/dl is treated with chelation therapy (27). Chelation is chemical treatment in which a drug binds to the lead in the blood and then the drug lead complex is excreted in the urine. Chelation is not used to treat adults with BLLs of <45 µg/dl, and is controversial for children because of the risk of adverse drug effects and

remobilized lead. The three main drugs are used for chelation: dimercaprol, edetate calcium disodium and succimer. The limitation of drug treatments for lead toxicity is that chelation cannot repair neurologic damage. Evidence of this is shown in Figure 5. Chelation does not reduce brain lead and may actually increase it. Chelation is expensive, painful and potentially dangerous and is not effective if the child goes back to a lead-infested environment. Therefore, the primary prevention of lead exposure is extremely important (27).

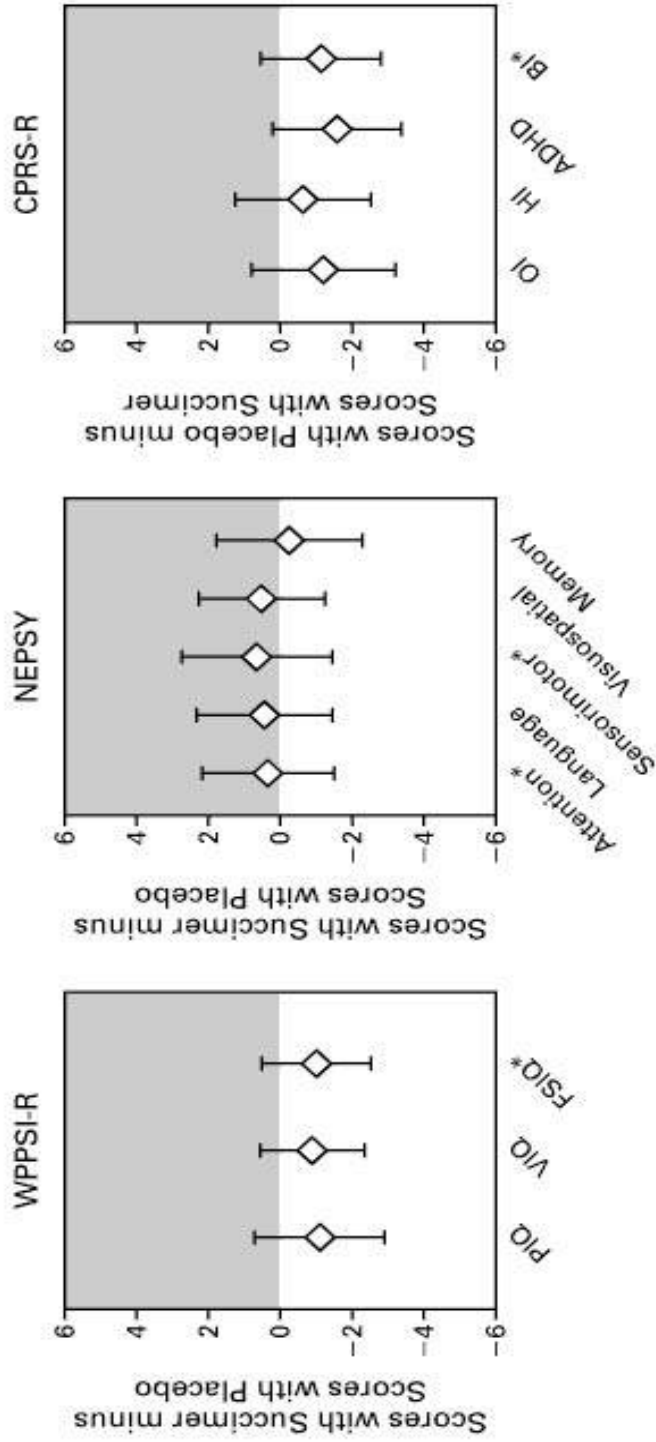


Figure 5: Difference of Neuropsychological Development Between Children Given Succimer vs. Placebo 36 Months After Treatment . PIQ is performance IQ, VIQ is verbal IQ, FSIQ is full-scale IQ, OI is oppositional index, HI is hyperactivity index, BI is behavioral index.
 Figure taken from Rogan, et al. 2001

STUDY OBJECTIVES

The goal of the current study is to investigate the effectiveness and cost savings of energy efficient, lead free, window replacement. Specifically we are evaluating how the repair or replacement of old, energy inefficient, lead contaminated windows from pre-1950s residential houses in three communities across New York State affect reduction of lead in dust, the most common source of lead exposure for children.

Hypothesis A:

Replacement of old, lead contaminated windows will result in a reduction in mean dust lead levels on interior floors, interior window sills and exterior window troughs compared to baseline.

Hypothesis B:

Repair of lead contaminated windows will result in a reduction in mean dust lead levels on interior floors, interior window sills and exterior window troughs compared to baseline.

METHODS

We collected dust lead data and self-reported health data from houses in New York State that are enrolled in the Low Income Home Energy Assistance Program (LIHEAP) through a unique collaboration between community-based organizations, weatherization programs, childhood lead poisoning prevention programs, and researchers. The homes were divided into three cohorts. Cohort 1 had full window replacement with energy-efficient windows; Cohort 2 underwent energy efficient window repair; and Cohort 3 did not undergo any window repair or replacement (Control Group).

Sample:

We performed a power calculation to ensure our sample size of housing units was adequate. While there are no data on longitudinal dust lead trends in houses undergoing weatherization (which is one of the reasons we believe this study is so important), related data was available for houses that have undergone lead hazard control, which typically includes window replacement and/or window repair. Data from 1034 housing units in the Evaluation of the HUD Lead-Based Paint Hazard Control Grant Program was used to perform the power calculation (Table 2) (28). There were 122 units with window repairs and 675 units with window replacement (28).

Table 2: Reduction in Geometric Mean Dust Lead Loading from Pre-Intervention*. Table taken from Dixon et al., 2005

Time	Window Treatment	Floors	Sills	Troughs
Immediate Post-Intervention	Repair	6%	69%	93%
	Replace	77%	97%	99%
6-Months Post-intervention	Repair	49%	37%	78%
	Replace	68%	91%	94%
12-Months Post-intervention	Repair	48%	39%	78%
	Replace	71%	92%	96%

* N = 1,034 Houses

Through the power calculations, it was determined that a minimum of 121 dwellings need to be treated with window repair to have a power of 90% and level of significance of 5%. A minimum of 66 dwellings would need to have window replacements would be needed for a power of 90% and level of significance of 5%. In total 187 homes are needed with window repair and replacement combined (121 homes treated with window repair and 66 with window replacement). To account for attrition over the 12 months of the study, we proposed to enroll a total of 300 homes: 130 homes with window repair, 70 homes with window replacement, and 100 homes serving as controls. Two sampling sites were chosen- Utica, NY and New York, NY. New York City was the field site of the Replacement Cohort 1, while Utica was the field site of both the Repair Cohort 2 and Control Cohort 3.

Dust Data:

Dust samples were collected from interior floors, interior window sills and external window troughs in three different rooms in each home before and after window replacement or repair; the living room, bedroom and kitchen. The data were collected at three different phases of the project. Window replacement and repair work were performed using lead-safe work practices. Window repairs included caulking, and scraping friction surfaces and assuring that paint on windows is smooth and not chipping or peeling. All dust lead analyses were conducted at a single laboratory for quality purposes and the laboratory was acknowledged by the EPA National Lead Laboratory Accreditation Program. The lead loading results, which is the amount of lead in micrograms contained in the dust collected from a certain surface area divided by the surface area in square feet, as well as information about each room in the unit or home where the sample was collected was assessed by the laboratory and recorded on Form 3 (Figure 6). The following data were recorded on Form 3: room identification number, dwelling id, room location, sample number, sample type (unpainted wood, painted wood, other painted surface, vinyl/tile, carpet), surface condition (good, fair, or poor), sample area dimensions, and results in micrograms per square foot ($\mu\text{g}/\text{ft}^2$). Masking tape was used to delineate the area that was sampled. Each surface was sampled by wiping with two strokes, one side-to-side and another top-to-bottom. After the window replacement and repair, specialized cleaning removed any lead-contaminated dust. Clearance testing to

confirm absence of lead hazards after cleanup was performed under phase 2B. The minimum reporting value for total lead was usually 20 µg, but this number is not constant throughout the study. Field and analytical blanks were completed on a random basis. These samples confirmed that the wipes were lead-free in order to minimize sources of error and also acted as a quality control measure.

A Niton X-ray Fluorescence was used to calculate lead concentrations on the wipes. The lead particles absorbed gamma rays and emit X-radiation. The amount of X-radiation is directly proportional to the concentration of lead.

Figure 6: Sample Form 3: Sample Type Code: 1= Unpainted Wood, 2= Painted Wood, 3= Other Painted Surface, 4= Vinyl/Tile, n5= Carpet, 6= Other. Surface Condition Code: 1= Good, 2=Fair, 3= Poor

Form 3- Dust Sample Collection

Phase		Building ID		Dwelling ID		
Room Function	Room Location #	Sample Type	Surface Condition	Sample Dimensions: Length (inches)	Sample Dimensions: Width (inches)	Loading Results (µg/ft ²)
Living Room Floor	2					
Living Room Window Sill	2					
Living Room Window Trough	2					
Bedroom Floor	3					
Bedroom Window Sill	3					
Kitchen Floor	4					
Field Blank						Lab Value:
Spiked Sample	True Value: Sample Number:			Lab Value:		

Figure 6 (continued): Sample Form 3: Sample Type Code: 1= Unpainted Wood, 2= Painted Wood, 3= Other Painted Surface, 4= Vinyl/Tile, n5= Carpet, 6= Other. Surface Condition Code: 1= Good, 2=Fair, 3= Poor

Assessor rating of basic general upkeep and basic cleanliness of home : _____ Code: 1= Appears clean, 2=Some evidence of house cleaning, 3= No evidence of house cleaning	
Lead Paint XRF data available (circle)? Yes No	
Name of Data Collector: (Print Name):	
Name of Site Coordinator: (Print Name):	
Initial	Date of Inspection (mm/dd/yy)

Health Interview Survey:

The Health Interview survey consists of 67 questions (Appendix). The questionnaire was drawn from the CDC National Health Interview Survey and was adapted to examine those health conditions related to housing quality. The health interview survey was a way to document expected benefits and evaluate the evidence of potential benefits. It measured lead hazard reduction benefits in upgraded homes and examined the health consequences of window replacement and window repair in the context of weatherization. The survey was conducted twice for each housing unit enrolled, once at phase 1 of the project and then a follow up at phase 3 of the project, which was roughly 1 year later, in order to identify other potential benefits for those households. Once informed consent

was obtained, each grantee conducted initial household interviews with residents in all occupied enrolled dwellings, even those that did not house children. The purpose of the interview was to get information about socioeconomic status and any conditions that may affect dust lead loadings. Information about the name, age, sex, race, and education of each resident, household size, how long the interviewee has lived in the home and much more was collected. When the resident family had a child or children at the time of enrollment, the legal guardian was additionally asked questions about each child. This part of the interview was conducted to find information about conditions potentially affecting the child's blood lead levels or the change in blood lead levels over time. Information gathered included the child's time spent away from house on weekdays and weekends, behavioral patterns, and more. Surveys were only conducted after obtaining the respondents' consent and the approval by the New York University School of Medicine and New York City HUD Institutional Review Boards. The consent form and survey are both available for reference in the Appendix section.

Forms 1 and 2:

A visual assessment of the overall exterior and interior condition of the home was completed at preintervention and recorded as well. The Form 1 contains the information about the exterior of the house and neighborhood. It

contains questions about the building condition, potential sources of lead around the area as a result of radiator shops, battery plants, bridge repainting, and more (Figure 7). The Form 2 is the visual inspection of the condition of the paint in each room, and recorded the number of repaired or replaced windows, as well as the number of double paned windows. The Form 2 also asked about surface quality for walls, ceilings, doors, floors, and trim (Figure 8).

Figure 7: Sample Form 1

Form 1 - General Visual Inspection of Structure & Neighborhood

PREVENTING CHILD RESIDENTIAL LEAD EXPOSURE BY WINDOW REPLACEMENT
 REVISION DATE 10/29/2010

Phase	Building ID	Dwelling ID

Local Lead Point Sources

1a. Is there a potential lead point source in the vicinity of the dwelling structure?
(within 4 blocks or 1500 feet of the building)
 Y = Yes, N = No

1b. If yes, specify: _____
Potential point sources include:
Permanent - radiator shops, battery plants, secondary smelters, auto shops, etc.
Temporary - demolition, exterior rehabilitation or exterior painting of nearby buildings; bridge repainting.

1c. Is this point source permanent or temporary?
 P = Permanent, T = Temporary, B = Both

Structural Condition

For each building component listed below, report whether there is obvious deterioration.
 Y = Yes, N = No, D = Does Not Apply, U = Unable to Observe

Exterior of Dwelling Unit

2. Roofs, gutters, downspouts:
 Roof missing parts or weathering surfaces or has extensive holes or cracks. Gutters or downspouts broken or missing.

3. Walls and siding:
 Large cracks or hole, missing or broken components requiring repairs or substantial painting.

4. Windows and doors:
 Two or more windows or doors broken, missing, or boarded up.

5. Porch or steps:
 Major elements broken or missing.

6. Foundation:
 Major cracks or missing material.

Name of Site Coordinator (Print):	Name of Data Collector (Print):	Initials	Date of Inspection (mm/dd/yy):
Leslyn Daligadu			

Figure 8: Sample Form 2

Form 2 – Visual Inspection of Paint Condition & Window Replacements/Repairs

PREVENTING CHILD RESIDENTIAL LEAD EXPOSURE BY WINDOW REPLACEMENT
REVISION DATE 10/29/2010

Phase	Building ID	Dwelling ID

Ratings for Paint:

0 = No Paint, 1 = Good, 2 = Fair, 3 = Poor, 4 = Component Not Present, 5 = Inaccessible

Room Location #/Name	Walls/Ceilings	Floors/Stairs	Trim	Doors	Windows						New Windows
					Interior Sills & Sashes	Troughs, Jambes & Exterior Sashes	Total Number of Windows Per Room	Number of Repaired Windows	Number of Double Paned Windows	Number of Replacement Windows	
Exterior											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Structural Condition

For each building component listed below, report whether there is obvious deterioration.

Y = Yes, N = No, D = Does Not Apply, U = Unable to Observe

Interior of Dwelling Unit

7. Walls, ceilings, doors and trim:

Extensive cracks in plaster; requires major painting; missing trim; doors need repair or replacement.

8. Floors:

Loose, missing, or cracked floor surfaces, surface is worn; deteriorated carpeting.

Name of Site Coordinator (Print):	Name of Data Collector (Print):	Initials	Date of Inspection (mm/dd/yy):
Leslyn Daligadu			

Statistical Analysis:

Data obtained from Form 3 and the Survey was compiled and inputted onto Microsoft Excel for statistical analysis. Both exploratory analysis and statistical modeling were performed on the data. The difference in loading results of a sample from a specific sampling location of a unit from Phase 1 to Phase 2 and Phase 1 to Phase 3 was calculated. An arithmetic mean dust lead loading was calculated for difference of the loading results. The means and statistics were generated for the interior components individually, as well as combined throughout the phases of the study. In order to analyze the results, multiple paired sample z-tests were performed for the loading results of samples in each unit between Phases 1 and 2, and Phases 1 and 3. This test was chosen because the two samples in the z tests are dependent because they come from the same source and are the before and after data for each unit. The z test was chosen because the sample size is greater than or equal to 30.

The null hypothesis is $H_0: \mu_d = 0$, meaning that the hypothesized difference in the loading results of each sample in each unit is 0. The alternative hypothesis is $H_A: \mu < 0$, meaning that the difference is less than 0. The alternative hypothesis shows that we are trying to see if there is a significant decrease in the loading results. All results will use a test statistic of $z = \frac{d - D}{(\sigma_d/\sqrt{n})}$ which equals the sample mean of pair wise differences minus the hypothesized mean of pair wise differences all over the standard deviation of population of pair wise differences divided by the sample size. The significance level (α) of 0.05 was

chosen. The p-value is compared to the significance level. If the p-value is smaller than α , the observed outcome was not very likely given that the null hypothesis is true so we reject the null hypothesis in favor of the alternative hypothesis. If the p-value is greater than α then the observed outcome was likely enough that it is reasonable to assume that the null hypothesis is true so fail to reject the null hypothesis.

RESULTS

Initially we used data obtained from 1034 housing units in the Evaluation of the HUD Lead-Based Paint Hazard Control Grant Program to perform a power calculation (28). Because we looked at houses undergoing weatherization, we expected reductions in floor dust lead loadings to be 67% of those observed in the HUD Evaluation (48% for repair and 71% for replacement as shown in Table 2 above). Therefore, we estimated that repair of old, lead contaminated windows, will result in at least a 32% reduction in geometric mean dust lead levels from baseline to 12-months post-intervention on floors. Similarly, we estimate that replacement of old lead contaminated windows will result in at least a 47% reduction in geometric mean dust lead levels from baseline to 12-months post-intervention on floors. Power calculations are based on sample t-tests. The standard deviations for those t-tests are those found in the Evaluation data set (standard deviations of $[\log(\text{dust at 12-months}) - \log(\text{dust at pre-intervention})]$ and were 1.42 and 1.75 $\mu\text{g}/\text{ft}^2$ for window repair and replacement, respectively).

In the study we enrolled 83 units with window replacements (Cohort 1), 58 units with window repairs (Cohort 2), and 25 units that had neither window replacements nor repairs (Cohort 3) (Table 3). Treatments in addition to window treatments were conducted in all cohorts because units often had children and relatively high levels of lead-based paint hazards. Therefore, the degree of dust lead reduction in this project might be less than those observed in the HUD

Evaluation, because baseline levels were lower to begin with. It is important to note that this study is still ongoing and due to unforeseen circumstances there is still data to be entered. Therefore, these are only preliminary results and analyses.

Table 3: The Number of Units by Cohort

Cohort	Number of Units Estimated	Number of Units enrolled	Units in Phase 1	Units in Phase 2	Units in Phase 3
Replacement	70	83	81 *97.6%	78 *94%	60 *72.3%
Repair	130	58	49 *84.5%	37 *63.8	22 *38%
Control	100	25	25 *100%	25 *100%	21 *84%
Total	200	166	155	140	103

*=Percent of units with respect to the number of units enrolled in each cohort

Table 4: Summary of Data for Cohort 3 (Control) by Sample Location: LR= Living Room, BR= Bedroom, KIT= Kitchen

Phase	Number of Units with Data	Average Loading Result (µg/ft)	Average Loading Result of Sample Floor LR (µg/ft)	Average Loading Result of Sample Sill LR (µg/ft)	Average Loading Result of Sample Trough LR (µg/ft)	Average Loading Result of Sample Floor BR (µg/ft)	Average Loading Result of Sample Sill BR (µg/ft)	Average Loading Result of Sample Floor KIT (µg/ft)
Phase 1	25	10396	643	10673	39100	188	11435	134
Phase 2	25	4762	136	2496	24259	175	2252	177
Phase 3	21	4896	142	1638	24148	123	3147	97

Table 5: Summary of Data for Cohort 1(Replacement) by Sample Location: LR= Living Room, BR= Bedroom, KIT= Kitchen

Phase	Number of Units with Data	Average Loading Result ($\mu\text{g}/\text{ft}$)	Average Loading Result of Sample Floor LR ($\mu\text{g}/\text{ft}$)	Average Loading Result of Sample Sill LR ($\mu\text{g}/\text{ft}$)	Average Loading Result of Sample Trough LR ($\mu\text{g}/\text{ft}$)	Average Loading Result of Sample Floor BR ($\mu\text{g}/\text{ft}$)	Average Loading Result of Sample Sill BR ($\mu\text{g}/\text{ft}$)	Average Loading Result of Sample Floor KIT ($\mu\text{g}/\text{ft}$)
Phase 1	81	362	16	424	1941	16	135	17
Phase 2	78	617	66	863	2107	95	721	63
Phase 3	60	204	13	231	994	20	117	15

Table 6: Summary of Data for Cohort 2 (Repair) by Sample Location: LR= Living Room, BR= Bedroom, KIT= Kitchen

Phase	Number of Units with Data	Average Loading Result ($\mu\text{g}/\text{ft}$)	Average Loading Result of Sample Floor LR ($\mu\text{g}/\text{ft}$)	Average Loading Result of Sample Sill LR ($\mu\text{g}/\text{ft}$)	Average Loading Result of Sample Trough LR ($\mu\text{g}/\text{ft}$)	Average Loading Result of Sample Floor BR ($\mu\text{g}/\text{ft}$)	Average Loading Result of Sample Sill BR ($\mu\text{g}/\text{ft}$)	Average Loading Result of Sample Floor KIT ($\mu\text{g}/\text{ft}$)
Phase 1	49	3059	133	2314	10681	1421	3662	80
Phase 2	37	430	42	140	271	49	2038	43
Phase 3	22	80	26	89	86	32	227	20

Table 7: Summary of Cohort 3 Data by Loading Results

Loading Results ($\mu\text{g}/\text{ft}$)	Number of Samples in Phase 1	Number of Samples in Phase 2	Number of Samples in Phase 3	Total Number of Samples
≤ 10	0 *0%	0 *0%	0 *0%	0
10<50	26 *17.2%	40 *26.8%	33 *26.4%	99
50<75	9 *6%	11 *7.4%	7 *5.6%	27
75<100	10 *6.6%	8 *5.4%	2 *1.6%	20
100<150	12 *8%	5 *3.4%	9 *7.2%	26
150<500	33 *21.9%	26 *17.4%	30 *24%	89
>500	61 *40.4%	59 *38.6%	44 *25.2%	164
Total	151	149	125	425

*=Percent of samples with respect to the total number of samples in each phase

Table 8: Summary of Cohort 1 Data by Loading Results

Loading Results (µg/ft)	Number of Samples in Phase 1	Number of Samples in Phase 2	Number of Samples in Phase 3	Total Number of Samples
≤10	97 *21%	29 *6.6%	0 *0%	126
10<50	225 *48.7%	163 *37%	238 *71.7%	626
50<75	26 *5.6%	33 *7.5%	16 *4.8%	75
75<100	14 *3%	27 *6.1%	11 *3.3%	52
100<150	19 *4.1%	30 *6.8%	13 *3.9%	62
150<500	41 *8.9%	65 *14.8%	30 *9%	136
>500	40 *8.7%	93 *21.1%	24 *7.2%	157
Total	462	440	332	1234

*=Percent of samples with respect to the total number of samples in each phase

Table 9: Summary of Cohort 2 Data by Loading Results

Loading Results (µg/ft)	Number of Samples in Phase 1	Number of Samples in Phase 2	Number of Samples in Phase 3	Total Number of Samples
≤10	3 *1.1%	0 *0%	0 0%	3
10<50	107 *37.8%	113 *53.6%	117 *88.6%	337
50<75	19 *6.7%	39 *18.5%	0 *0%	58
75<100	25 *8.8%	24 *11.4%	2 *1.5	51
100<150	13 *4.6%	7 *3.3%	2 *1.5	22
150<500	34 *12%	16 *7.6%	7 *5.3	57
>500	82 *29%	12 *5.7	4 *3%	98
Total	283	211	132	626

*=Percent of samples with respect to the total number of samples in each phase

Table 10: Statistical Data for Cohorts 1, 2, and 3

	Cohort 1 Phase 1 to Phase 2	Cohort 1 Phase 1 to Phase 3	Cohort 2 Phase 1 to Phase 2	Cohort 2 Phase 1 to Phase 3	Cohort 3 Phase 1 to Phase 2	Cohort 3 Phase 1 to Phase 3
N	425	316	156	96	148	125
Standard deviation	2397.55	1301.08	7472.803	3503.602	29091	34026.17
Sample Mean	192.99	-95.23	-1576.44	-1110.77	-5703.85	-7026.48
Hypothesized mean	0	0	0	0	0	0
Z value	1.65	-1.3	-2.63	-3.10	-2.39	-2.32
P-value	Significant	not Significant	Significant	Significant	Significant	significant

The Control Group was used to analyze the variance of the data to see if the results are truly statistically significant. All calculations are based on a .05 significance level (using a critical Z value of -1.645 on the left tail test). Looking at Table 10 above, we can see that at this point in the study, the data of Cohort 1 from Phase 1 to 2 and Phase 1 to 3 both fail to reject the notion that the mean lead levels before and after window replacement are equal, i.e. there was not a statistically significant reduction. There, is however, significant evidence that from Phase 1 to 2, cohort 1's mean lead levels surprisingly increased, showing that the lead levels significantly increased right after window replacement. The data in Cohort 2 rejected the null hypothesis that the mean lead levels before and after window repair were equal, in support of the hypothesis B that repair of windows will result in a reduction in mean dust lead levels on interior floors, interior window sills and exterior window troughs. This is supported not only from the data from Phase 1 to 2, but also from Phase 1 to 3.

Looking at these results, at this point in data entry and analysis, it appears that window replacement decreases the average lead loading results by 43.6%, while window repairs decreased the average lead loading result by 97.4%. Both of these percentages are in agreement with the estimations calculated from Table 2.

Tables 7 and 8 show a general declining trend in the number of samples with loading results above 75 $\mu\text{g}/\text{ft}$ from Phase 1 to Phase 3. The greatest decrease is seen when looking at the percent of samples less than 500 $\mu\text{g}/\text{ft}$.

Tables 4, 5, and 6 shows that the living room trough had higher lead dust levels than the other locations and should be a focus when calculating lead levels in homes, possibly due to the fact that families open and close these more often than windows in other rooms.

DISCUSSION

The results of this study appear to not fully support its original hypotheses. For the window replacement cohort from Phase 1 to Phase 2, we failed to reject the null hypothesis, which means that there was no decrease in loading results across these two phases. In fact looking at the numbers, many units appear to have had an increased loading result. This could be because after the window replacements, the weatherization groups did not properly clean the home. Renovation work that is not followed up with proper clean up can lead to hazardous lead dust levels. Window replacement is a more disruptive process to the paint and would generate more lead dust. The units with elevated lead levels in phase 2 were entered again for a 2nd clearance under a phase 2b in order to be recleaned so that living in the unit was not hazardous to the tenants health. This problem of improper cleanup is prevalent and can be fixed with workshops that teach weatherization groups accurate cleaning techniques and regulations that require these techniques. We believe that this is an extremely important finding as weatherization efforts increase.

Statistically the Cohort 3 also rejected the notion that its mean lead levels in Phase 1 and 2 were the same, as well as its lead levels from Phase 1 to 3. This might be due to various reasons, the most plausible being that cohort size was too small. As mentioned in the Methods Section, the control group size was reduced from 100 units proposed to only 25 units. This substantial decrease in

sample size could be a source of the statistically significant finding. This significance can also be due to the fact that tenants in the control groups were offered the use of a HEPA vacuum and knowledge and education. Information about healthy practices to maintain low home lead levels and using the high powered vacuum would both decrease lead levels in homes.

Another limitation that was encountered in this study was that the laboratories that the samples were sent out to failed to keep records of the QC forms which recorded the lead machine values. Since a high percentage of postintervention dust lead samples were initially reported as “below detection” and limiting statistical analyses. We needed the actual “machine results” so that we could substitute them for the “below detection values”. About 50% of the unit samples had lead levels below detection limit. Therefore we could not receive an exact lead loading result and instead the lead detection limit in each of these cases was assumed to be the loading result in order to account for the greatest possible error. There are also a few cases where the lead detection limit was not available and the loading result is listed at BRL for below recording level (Appendix). Because the recording level is not known, these results were left blank.

Error may have resulted from the different laboratories that were used for sample analysis. The original plan, as mentioned in the Methods Section, was to only use one laboratory in order to keep conditions equal. Unfortunately, the lab

that we used outsourced a bulk of the sample analyses to other labs so multiple laboratories were used and could not be controlled for.

There were unimaginable delays in this project due to difficulties finding weatherization partners, cuts in health department staff because of the recession, and Hurricane Sandy, that left us unable to complete data collection. All fieldwork ceased in January 2013 as originally planned and leaving units with incomplete data sets. It need to be emphasized that this is only a preliminary analysis, as there still is data that needs to be entered and there is still data that we are waiting for from the field.

The data in the tables in the Appendices, which were used for the statistical analysis, have not yet been checked for errors. This quality check is vital to the validity the data. Because the results are handwritten on Form 3, which dictates information from the lab report and that form is entered on excel, there are many routes for human error. This can be errors in loading results, phases, or units from copying from the lab reports onto the forms, or copying from the forms onto the excels. It is important to check this work for quality assurance. The data has also not been analyzed by the statisticians who are a part of this study.

For many units there are incomplete phases, thereby decreasing the sample size of the study. This is because many units dropped out or refused to let the weatherization groups back into the homes for Phase 2 or Phase 3. Once of the reasons for this is because there was a high turnover of tenants, so a high

percentage of tenants present for Phase 1 had moved out by Phase 3. This greatly constrains the data available for analysis from the Health Interview Survey. Many of the Utica Units (which were the control and repair units) did not have tenants residing in them and thus had incomplete Health Interview Survey information because for these units no Health Interview Surveys were conducted. The Health Interview Survey is something that can be looked at and analyzed to see the benefit of the window replacements and repair. The Form 1 and Form 2 can be used to compare lead levels and the exterior and interior conditions of the units. The Health Interview Survey, Form 1, and Form 2 data has not been analyzed yet.

Tobacco contains lead. One analysis that can be done in the future would be to look at the lead decrease throughout the 3 phases and to see if the homes with smokers had a significantly less decrease in home lead levels. This could also be a reason that in some homes the lead loading results for Phase 2 had a significant increase. Overall however it is the results over time (from Phase 1 to Phase 3) that are really important.

The lead loading limit guidelines for the floor is 40 $\mu\text{g}/\text{ft}$, sill is 250 $\mu\text{g}/\text{ft}$, and trough is 400 $\mu\text{g}/\text{ft}$ (29). Looking at Tables 3 to 9, we can see the enormous number of samples that have surpassed these limits.

Data strongly suggests that window repair is more effective than window replacements. The main goal of weatherization groups is to help save families money and to save energy in way to better the environment. Their focus is not

necessarily decreasing lead levels and protecting children which is why regulations need to be implemented. Lead exposure to children continues to be an important issue in Pediatrics and Environmental Medicine. Lead in houses especially through lead dust is the primary source of exposure. This study, like many others, has its limitations. This was the first endeavor to merge efforts of public health departments and weatherization groups. This partnership rapidly created jobs and combined energy saving with lead poisoning prevention. Hopefully this is only the beginning of many collaborations to come.

APPENDIX

Consent form:

H#: 09-1141

**Consent Version Date: 11/ 03/09
Institutional Review Board
NYU School of Medicine**

Mailing: 550 First Ave. Building #VET 10 West NY, NY 10016
Physical: 423 East 23rd Street | NY, NY 10010
Phone: 212.263.4110
Fax: 212.263.41



Michael Weitzman, MD

INFORMED CONSENT FORM TO PARTICIPATE AND AUTHORIZATION FOR RESEARCH

TITLE OF RESEARCH:

The National Institute of Environmental Health/Preventing Child Residential Lead Exposure by Window Replacement.

A. PURPOSE OF THE STUDY:

You are invited to join a research study on the possible effects of housing energy repairs that involve either window repairs or window replacement on your health and well-being. You are asked to become involved because you live in a home that is about to be repaired to lower the electricity and power costs, to lower the chances that the home has lead hazards, and to improve your comfort and safety, or because you live in a house that may be eligible for such repairs in the near future.

For this study, one adult in the household will be interviewed to answer questions about his or her health, and about the health of his or her two youngest children aged 1-6 who may live in the home. You may take part in this study whether or not you have children living in the home. We also will collect samples of dust from your home at three separate times to test for the amount of lead that is in it.

Taking part in this study is entirely voluntary. Your rental or energy upgrade services will not be affected by whether you decide to join or not join in this study. The repairs will be performed even if you do not agree to take part in this study.

The purpose of the study is to learn more about you and your household's health before repairs take place and one year after the repairs, or in some cases, to see if your health changes over the course of the year even if no repairs are done. Similarly, we wish to see if the level of lead in your household's dust changes over the course of the year and whether these changes are different for homes that are having windows repaired, windows replaced, and for homes with no window repairs or replacement.

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Subject's Initials: _____ Date: _____

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B. SUBJECT PARTICIPATION:

There will be 3 sites involved in this study and we estimate that a total of 300 subjects will enroll in this study

SUBJECT PARTICIPATION

We are enrolling households in that are planned to have window replacement or repair for weatherization assistance purposes, or households that may have such repairs in the future.

Your participation will involve 3 visits to your home, which will take place over an approximately 1 year long period.

Each visit will take approximately one hour.

C. DESCRIPTION OF THE RESEARCH:

If you agree to participate in this research and sign informed consent document, these research related procedures will be conducted:

- You are being asked to take part in 2 interviews, separated by about a year, that will be conducted in person, in your home, with team members who work for your local health department's childhood lead poisoning prevention program, about your health and the health of two children in your household.
- You will be asked about what you do to keep up the home, common health problems like colds and asthma and how you rate your health and if applicable, the health of your children.
- Health Department personnel will collect samples of dust from the windowsills outside your home and window sills and floors from 3 different rooms in your home.
- The dust will be analyzed for lead in it at a laboratory that is experienced in such work, and members of the team will inform you of the results of the lead in dust, and practical things that you can do that may help reduce the risk to children and others in the home of lead that might be in the dust.

D. COSTS/REIMBURSEMENTS:

There are no costs to you or your family of participating in this study. We will compensate you with a \$20 voucher each of the three times that we visit your home over the approximately one year time that you will be in the study.

All study-related costs associated with your being in this study will be paid by the National Institutes of Health. You or your insurance company will not be charged or held responsible for the costs of your participation in this study.

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This study is being sponsored by a grant from the National Institutes of Health. Portions of Dr. Weitzman's salary and his research team's salaries are being paid by this grant.

E. POTENTIAL RISKS AND DISCOMFORTS:

There are no physical risks associated with this study. You will be asked questions about personal issues during this study such as smoking habits, prior injuries and physical and mental health issues. These types of personal questions may make you uncomfortable. You do not need to answer any question that you are not comfortable answering. You also will be informed about possible lead hazards in your home, and it is possible that this may make you uncomfortable.

There is the potential loss of privacy during the home visit by members of the research team. You may be concerned about how we will store/protect your data. We will do our best to protect your confidentiality and to keep the information private and will keep all data locked and in a secure location. We are required to protect your privacy and will not share your information with anyone outside of the study team. When the results of the research are published or discussed in conferences, no information will be included that would reveal your identity.

The team will not report on your immigration or other status to state, federal, or local governments.

F. POTENTIAL BENEFITS:

While there may be few, or even no direct benefits to you from taking part in this study, this study will help the study team learn more about whether repairs help to reduce health problems, especially lead dangers in the home. This can help other families across the country. You will be informed of the results of the lead in dust in your home, and simple, practical ways that may help you reduce the exposure of children and adults in the home to lead. Also, if there are health problems that you wish help with, members of the team will inform you on possible services in your community that may help you with them.

G. ALTERNATIVES TO PARTICIPATING IN THE STUDY

You do not need to take part in this research study. You will still be eligible for energy assistance for your home, if in fact you already were planning on receiving such assistance. Your alternative is to not take part.

H. CONFIDENTIALITY:

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Private information about you that identifies you may be used or shared for the purposes of this research project. This section of the consent/authorization form describes how your information will be used and shared in this research, and the ways in which NYU School of Medicine will safeguard your privacy and confidentiality.

If you agree to be in this research program, Dr. Michael Weitzman and his study team will ask you to have certain tests and questionnaires as described above. He will use these test results to complete this research only. The results of these tests will be kept in locked cabinets in Dr. Weitzman office. Information that identifies you will be removed from the interview forms and replaced with a Study ID code. The code key that identifies each person will be placed in a locked cabinet to protect your privacy during the study. This code will be destroyed when all of the data from the study have been collected. Results of tests and studies done just for this research study only.

Other persons and organizations, including co-investigators, federal and state regulatory agencies, and the IRB(s) overseeing the research may receive your information during the course of this study. Except when required by law, study information shared with persons and organizations outside of New York University School of Medicine (NYUSM) will not identify you by name, social security number, address, telephone number, or any other direct personal identifier.

When your study information will be disclosed outside of NYUSM as part of the research, the information that can identify you as listed above will be removed and your records will be assigned a unique code number. NYUSM will not disclose the code key, except as required by law.

Confidentiality of Your Study Information

Your study records include information that identifies you and that is kept in research files. We will try to keep this information confidential, but we cannot guarantee it. If data from this study are to be published or presented, we will first take out the information that identifies you.

Retention of Your Study Information

The study results will be kept in your research record for at least six years or until after the study is completed, whichever is longer. At that time either the research information not already in your medical record will be destroyed or information identifying you will be removed from such study results at NYU. Any research information in your medical record will be kept indefinitely.

Your HIPAA Authorization

A new federal regulation, the federal medical Privacy Rule, has taken effect as required by the Health Insurance Portability and Accountability Act (HIPAA). Under the Privacy Rule, in most cases we must seek your written permission to use or disclose identifiable health information

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about you that we use or create [your "protected health information"] in connection with research involving your treatment or medical records. This permission is called an Authorization.

If you sign this form you are giving your Authorization for the uses and sharing of your protected health information described below. You have a right to refuse to sign this form. If you do not sign the form you may not be in the research program, but refusing to sign will not affect your energy assistance for your home.

This Authorization will not expire unless you withdraw it in writing. You have the right to withdraw your authorization at any time, except to the extent that NYU has already relied upon it or must continue to use your information to complete data analysis or to report data for this study. The procedure for revoking your authorization is described below in Section K.

By signing this form you authorize the use and disclosure of the following information for this research:

- Your research record
- Results of laboratory tests
- Research observations made during your participation in the research

By signing this form you authorize the following persons and organizations to receive your protected health information for purposes related to this research:

- Every research site for this study, including this hospital, and including each sites' research staff and medical staff
- Every health care provider who provides services to you in connection with this study
- Any laboratories and other individuals and organizations that analyze your health information in connection with this study in accordance with the study's protocol
- The following research sponsors and the people and companies they use to overseeadminister, or conduct the research: National Institute of Environmental Health Sciences.
- The United States research regulatory agencies
- The members and staff of the hospital's affiliated Institutional Review Board
- The members and staff of the hospital's affiliated Privacy Board
- Principal Investigator: Michael Weitzman, MD
- Study Coordinator
- Members of the Dr. Weitzman's Research Team
- The Patient Advocate or Research Ombudsman (GCRC)
- Members of the NYU/NYUMC Clinical Trials Office/Office of Research and Sponsored Programs
- Data Safety Monitoring Board/Clinical Events Committee
- Others (as described below): National Center for Healthy Housing/US Department of Housing and Urban Development.

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NYU School of Medicine**

If any of the companies or institutions listed above merges or is sold during the course of this research, your Authorization will cover uses and disclosures of your protected health information to the new company or institution that assumes responsibility for the research.

Please be aware that once your protected health information is disclosed to a person or organization that is not covered by the federal medical Privacy Rule, the information is no longer protected by the Privacy Rule and may be subject to redisclosure by the recipient.

I. COMPENSATION/TREATMENT IN THE EVENT OF INJURY:

All forms of risk may potentially involve some risk of injury, although in the case of this study your participation will only involve the collection of dust from your home and your answering questions about the health of you and your family. There also always is the possibility that there may be risks associated with any study that we do not know about ahead of time. In spite of all precautions, although we believe it very unlikely, you might develop medical complications from being in this study.

If you sustain any injury during the course of the research or experience any side effect to a study procedure, please contact the Principal Investigator Michael Weitzman at the following telephone number: 212-263-8695. If such complications arise, your local health department will assist you in obtaining appropriate medical treatment but this study does not provide financial assistance for medical or other injury-related costs. You do not give up any rights to seek payment for personal injury by signing this form.

J. VOLUNTARY PARTICIPATION AND AUTHORIZATION:

Your decision as to whether or not to take part in this study is completely voluntary (of your free will). If you decide not to take part in this study it will not affect the care you receive and will not result in any loss of benefits to which you are otherwise entitled.

You will be told of any significant new findings developed during the course of the research that may influence your willingness to continue to participate in the research.

Your decision as to whether to give your Authorization for the use and disclosure of your protected health information for this study is also completely voluntary; however, if you decline to give your Authorization or if you withdraw your Authorization you may not participate in the study.

6 of 9

Subject's Initials: _____ Date: _____

(IRB Official Use Only)

This Consent Document is approved for use by the New York University's Institutional Review Board (IRB). Only the IRB-stamped approved form may be used.

Approved: From: 08/23/2011 To: 08/22/2012

The study expiration date applies for this form

Template rev. date: 2006-03-16

09-1141 NIH-IRB Consent 11-3- 09.doc

**NYUSOM
IRB APPROVED**

H#: 09-1141

**Consent Version Date: 11/ 03/09
Institutional Review Board
NYU School of Medicine**

K. WITHDRAWAL FROM THE STUDY AND/OR WITHDRAWAL OF AUTHORIZATION:

If you decide to take part in the study, you may withdraw from participation at any time without penalty or loss of benefits to which you would otherwise be entitled. You may also withdraw your Authorization for us to use or disclose your protected health information for the study. If you do decide to withdraw your consent, we ask that you contact Dr. Weitzman and let him know that you are withdrawing from the study. His mailing address is Michael Weitzman MD, Department of Pediatrics, The New York University School of Medicine, 550 First Avenue, NBV 8S4-11, New York, NY 10016. If you wish to withdraw your Authorization as well you must contact Dr. Weitzman in writing. Remember that withdrawing your Authorization only affects uses and sharing of information after your written request has been received, and you may not withdraw your Authorization for uses or disclosures that we have previously made or must continue to make to complete analyses or report data from the research.

The Principal Investigator or another member of the study team will discuss with you any considerations involved in discontinuing your participation in the study. You will be told how to withdraw from the study and may be asked to complete a final survey and have final house dust samples collected to measure their lead content.

The study doctor may also decide to withdraw you from the study for certain reasons. Some possible reasons for withdrawing a subject from the study would be:

- (a) failure to keep appointments
- (b) the family moving to a new residence

L. PERMISSION TO CONTACT YOU ABOUT FUTURE RESEARCH:

I authorize the principal investigator and his or her co-investigators to contact me about future research on housing and lead exposure provided that this future research is approved by the original IRB of record and that the principal investigator and co-investigator are affiliated with the research protocol.

If I agree, then someone from Dr. Weitzman's research staff might contact me in the future and he or she will tell me about a research study. At that time, I can decide whether or not I am interested in participating in a particular study. I will then have the opportunity to contact the researcher to schedule an appointment to be fully informed about the research project.

I agree to be contacted by the Principal Investigator or Co-Investigators of the research study titled: The National Institute of Environmental Health/Preventing Child Residential Lead Exposure by Window Replacement.

7 of 9

Subject's Initials: _____ Date: _____

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H#: 09-1141

**Consent Version Date: 11/ 03/09
Institutional Review Board
NYU School of Medicine**

I **do not** want to be contacted by the Principal Investigator or Co-Investigator of the research study titled: The National Institute of Environmental Health/Preventing Child Residential Lead Exposure by Window Replacement.

Signature of participant or legal representative

Date

Your permission to allow us to contact you about future research would be greatly appreciated, but it is completely voluntary. If you choose not to allow us to contact you, it will not affect your care. Please understand that giving your permission to do this is only for the purpose of helping us identify subjects who may qualify for one of our future research studies. It does not mean that you must join in any study.

M. CONTACT PERSON(S):

For further information about your rights as a research subject, or if you are not satisfied with the manner in which this study is being conducted and would like to discuss your participation with an institutional representative who is not part of this study, please contact the Administrator, Institutional Board of Research Associates, Telephone No. 212-263-4110.

If you have any questions or sustain any injury during the course of this study, please contact the Principal Investigator, Michael Weitzman MD, at the following telephone number: 212-263-8695.

AGREEMENT TO PARTICIPATE AND AUTHORIZATION FOR THE USE OR DISCLOSURE OF PROTECTED HEALTH INFORMATION:

Part of the consent process includes your Authorization to use Protected Health Information for the purposes of this study, as described above. If you do not want to authorize the use of this PHI, you should not agree to be in this study.

- I have read this consent form
- or
- it was read to me by: _____.

Any questions I had were answered by: _____.

I am am not participating in another research project at this time.
(If yes, you should discuss this with your study doctor.)

8 of 9

Subject's Initials: _____ Date: _____

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**Consent Version Date: 11/ 03/09
Institutional Review Board
NYU School of Medicine**

I voluntarily agree to participate in this research program that is being coordinated at the New York University School of Medicine and the National Center for Healthy Housing, and which is occurring in:

- NYUSM
- National Center for Healthy Housing, Columbia, MD
- Oneida County Health Department, Utica, NY
- Other, please write in : _____

I understand that I am entitled to and will be given a copy of this signed Consent/Authorization Form.

By signing this Consent/Authorization form, I give my Authorization for the uses and disclosures of my protected health information as described above.

WHEN THE SUBJECT IS AN ADULT:

* For subjects who may not be capable of providing informed consent, the signature of a legal representative is required. For a valid HIPAA authorization, the "personal representative" must have authority under state law to make health care decisions for the subject.

Print Name of Participant
or Legal Representative*

_____/_____
Signature of Participant Date
or Legal Representative*

Print Name of Person
Obtaining Consent

_____/_____
Signature of Person Date
Obtaining Consent

** When the elements of informed consent are presented orally to the subject or representative, a witness to the oral presentation is required. [NOTE: it is unclear whether HIPAA authorization may be presented orally – this might require an IRB waiver to permit alteration of the form of authorization]

Print Name of Witness**

_____/_____
Signature of Witness** Date

9 of 9

Subject's Initials: _____ Date: _____

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**NYUSOM
IRB APPROVED**

Health Interview Survey:

Study ID:	Interview:
	<input type="checkbox"/> Baseline <input type="checkbox"/> 1-Year post-retrofit

Last Update: 8/25/10

The Health Survey Interview

Telephone Surveyor Name (print):	Surveyor Signature:	Date (mm/dd/yy):

NCHH QC Review (print name):	Initials:	Date (mm/dd/yy):

Items in bold or text boxes are to be asked of respondent. Capitalized items that are not in bold represent prompts to interviewer.

Tables are used to record responses when question sequence is asked for more than one member of the household.

If questions are repeated, record household member's preferred name in table as means of identification. Interviewer will assign ID number to each household at end of the session and enter this into the study ID box in the header.

Study ID:	Interview:
	_____ Baseline
	_____ 1-Year post-retrofit

Last Update: 8/25/

1. What is the name of the head of the household who knows about the health of the two youngest children between ages 1-6 who live at the home? We will not tell the property managers, immigration, or law enforcement anything about who lives here – we need this information only to know how much use the home will get. This information will help us figure out how the changes in the buildings affect the people who live in them.

REPEAT SEQUENCE (Q2-7) FOR ONE ADULT AND THE TWO YOUNGEST CHILDREN BETWEEN 1 AND 6 WHO LIVE IN THE UNIT. NOTE THAT ‘YOU’ IS CAPITALIZED IN QUESTIONS IF THE QUESTION IS TO BE REPEATED IN REGARD TO ONE ADULT AND UP TO TWO CHILDREN IN THE HOUSEHOLD. IF ONE CHILD IS IN THE HOUSEHOLD, INTERVIEW THE ADULT RESPONDENT ABOUT THAT ADULT AND THAT ONE CHILD IF NO CHILDREN ARE IN THE HOUSEHOLD, INTERVIEW THE ADULT. DO NOT INTERVIEW OTHER ADULTS OR ASK THE RESPONDENT ABOUT OTHER ADULTS.

2. What should I call YOU for the rest of the interview?

3. Do YOU usually live here or spend more than 2 hours each day here or sleep here?

1. Yes [SKIP TO Q5 AND INCLUDE IN INTERVIEW]
2. No [DO NOT INTERVIEW THIS PERSON]
97. Refused
99. Don't know

4. Since YOU do not usually live or sleep here and have another residence elsewhere, you will not be included in this interview.

1. Yes (will be in interview)
2. No (will not be in interview)

5. * ASK IF NOT APPARENT. * IF DON'T KNOW REFUSED ENTER YOUR BEST GUESS.

Are YOU male or female?

1. Male
2. Female
97. Refused
99. Don't know

Adult/Child #	First Name	Middle Name	Last Name	Preferred Name	Usually lives here (#3)	Gender (#5)
Adult 1						
Child 1						
Child 2						

Study ID:	Interview:
	<input type="checkbox"/> Baseline
	<input type="checkbox"/> 1-Year post-retrofit

Last Update: 8/25/10

NOW I AM GOING TO BE ASKING ABOUT THE AGE AND ETHNIC BACKGROUND OF THE ADULT AND UP TO TWO CHILDREN IN THE HOUSEHOLD AGED ONE TO SIX.

6. What is YOUR age?

* ENTER NUMBER FOR AGE.

- 10. October
- 11. November
- 12. December
- 97. Refused
- 99. Don't know

7. And what is YOUR date of birth?

Please give month, day, and year for the date of birth.

* ENTER MONTH OF BIRTH.

- 01. January
- 02. February
- 03. March
- 04. April
- 05. May
- 06. June
- 07. July
- 08. August
- 09. September

8. What is your best guess of YOUR age?

* IF THE RESPONDENT GIVES A RANGE OF AGES, ENTER LOWEST AND HIGHEST NUMBER IN THE RANGE. IF THE RESPONDENT DOES NOT KNOW THE AGE, ENTER YOUR BEST ESTIMATE OF THE PERSON'S AGE.

- 000-120 Age (number)
- 97. Refused
- 99. Don't know

Adult/Child #	Preferred Name	Age in Years (#6)	Date of Birth (#7)			Respondent Age Estimate (#8)	
			Month	Day	Year	Low (Years)	High (Years)
Adult 1							
Child 1							
Child 2							

REPEAT FOR ONE ADULT AND UP TO TWO CHILDREN WHO LIVES IN THE UNIT.
NOTE THAT 'YOU' IS CAPITALIZED IN QUESTION IF THE QUESTION IS TO BE REPEATED IN REGARD TO ONE ADULT AND UP TO TWO CHILDREN.

9. What race do YOU consider yourself to be?

- 1. White
- 2. Black/African American
- 3. African
- 4. Indian (American)
- 5. Alaska Native
- 6. Pacific Islander

- 7. Hispanic or Latino
- 8. Asian
- 9. Some other race
- 97. Refused
- 99. Don't know

Adult/Child #	Preferred Name	Race (#9)
Adult 1		
Child 1		
Child 2		

Study ID:	Interview:
	_____ Baseline
	_____ 1-Year post-retrofit

Last Update: 8/25/10

10. When did you move into THIS home?

Month _____ Year _____
 97. Refused
 99. Don't know

11. If you have a fan over the stove, how often is it used when someone cooks?

1. Always
2. Frequently
3. Sometimes
4. Rarely
5. Never
6. No fan over the stove or fan not working
97. Refused
99. Don't know

12. If you have a fan in one or more bathrooms, how often is it used when someone takes a bath or shower?

1. Always
2. Frequently
3. Sometimes
4. Rarely
5. Never
6. No bathroom fan in any bathrooms or fan(s) do not work
97. Refused
99. Don't know

13. Has there been water or dampness in your home due to broken pipes, leaks, heavy rain, floods, or for other reasons?

1. YES
2. NO
97. Refused
99. Don't know

14. Does your home frequently have a mildew odor or musty smell?

1. YES
2. NO
97. Refused
99. Don't know

15. Do you use a dehumidifier in your home?

1. YES
2. NO
97. Refused
99. Don't know

16. Do you have any problems with cockroaches in this current home?

1. YES
2. NO [GO TO 18]
97. Refused [GO TO 18]
99. Don't know [GO TO 18]

Study ID:	Interview:
	_____ Baseline
	_____ 1-Year post-retrofit

Last Update: 8/25/10

17. On average how many cockroaches do you see per day?

- 1. Less than 5
- 2. 5 to 50, or
- 3. More than 50
- 4. None
- 97. Refused
- 99. Don't know

18. Do you use any insecticides or bug sprays in your home to control COCKROACHES or other insects?

- 1. YES
- 2. NO
- 97. Refused
- 99. Don't know

19. In the last year did professional exterminators or building maintenance personnel use insecticides or bug sprays in your home to control COCKROACHES or other insects?

- 1. YES
- 2. NO
- 97. Refused
- 99. Don't know

20. Do you have any problems with mice or rats in your current home?

- 1. YES
- 2. NO
- 97. Refused
- 99. Don't know

21. Do you have any of the following pets living in your current home? Please answer Yes or No for each type of pet.

- 1. YES
 - 2. NO
 - 97. Refused
 - 99. Don't know
- | | | | | |
|--------------------------------------|---|---|----|----|
| a. Cat | 1 | 2 | 97 | 99 |
| b. Dog | 1 | 2 | 97 | 99 |
| c. Other animals with fur | 1 | 2 | 97 | 99 |
| d. Any other pets
(Specify) _____ | 1 | 2 | 97 | 99 |

22. Do you use a humidifier in your home?

- 1. YES
- 2. NO
- 97. Refused
- 99. Don't know

Study ID:	Interview:
	_____ Baseline
	_____ 1-Year post-retrofit

Last Update: 8/25/10

23. During the last 12 months, was there any smoke in your home? By smoke I mean smoke from any of the following: incense, cigarettes, cigars, pipes, candles, wood fires, or non-tobacco cigarettes. This would include household members or visitors.

- 1. Yes
- 2. No [GO TO Q26]
- 97. Refused [GO TO Q26]
- 99. Don't know [GO TO Q26]

24. What is the most common source of smoke in the home? [CIRCLE ALL THAT APPLY]

- 1. Cigars, cigarettes, pipes
- 2. Incense or candles
- 3. Charcoal or some other type of heating source
- 4. Other (describe) _____
- 97. Refused
- 99. Don't know

25. How often is there smoke inside the home?

- 1. Less than once a week
- 2. Sometime each week, but not every day
- 3. Every day
- 4. Never
- 97. Refused
- 99. Don't know

26. How easy is it for you to keep this current home clean?

- 1. Easy
- 2. Neither easy nor hard
- 3. Hard
- 97. Refused
- 99. Don't know

27. How would you rate the comfort of your home in terms of temperature in the summer?

- 1. Hot
- 2. Neither hot nor cold
- 3. Cold
- 97. Refused
- 99. Don't know

28. How would you rate the comfort of your home in terms of temperature in the winter?

- 1. Hot
- 2. Neither hot nor cold
- 3. Cold
- 97. Refused
- 99. Don't know

29. How would you rate the amount of noise that you can hear from your neighbors?

- 1. Very noisy
- 2. Some noise
- 3. Quiet
- 97. Refused
- 99. Don't know

Study ID:	Interview:
	<input type="checkbox"/> Baseline <input type="checkbox"/> 1-Year post-retrofit

Last Update: 8/25/10

NOTE THAT 'YOU' IS CAPITALIZED IF THE QUESTION IS TO BE REPEATED FOR THE ADULT AND UP TO TWO CHILDREN IN THE HOUSEHOLD.

30. Would you say YOUR health in general is currently excellent, very good, good, fair, or poor?

- 1. Excellent
- 2. Very Good
- 3. Good
- 4. Fair
- 5. Poor
- 97. Refused
- 99. Don't know

Adult/Child #	Preferred Name	General Health (#30)
Adult 1		
Child 1		
Child 2		

31. Has [CHILD'S NAME] EVER been told by a doctor or other health professional that [HE/SHE] has...

a. Frequent or severe headaches, including migraines

- 1. Yes
- 2. No
- 97. Refused
- 99. Don't know

REPEAT QUESTION STEM AS NEEDED FOR OTHER CONDITIONS.

b. Lead poisoning

c. Learning disability

d. Attention deficit/hyperactivity (ADD/ADHD)

e. Overweight

f. Three or more ear infections per year

**32. ASK THIS QUESTION ONLY FOR HEALTH CONDITIONS THAT had an ANSWER of "YES" IN Q31:
Was this condition identified while living in the home BEFORE AND/OR AFTER the energy work was done?**

- 1. Before Weatherization
- 2. After Weatherization
- 3. Both
- 97. Refused
- 99. Don't know

Child #	Preferred Name	a. Headaches/ Migraines		b. Lead Poisoning		c. Learning Disability		d. ADD/ ADHD		e. Overweight		f. 3+Ear Infections/year	
		Q31	Q32	Q31	Q32	Q31	Q32	Q31	Q32	Q31	Q32	Q31	Q32
Child 1													
Child 2													

Study ID:	Interview:
	<input type="checkbox"/> Baseline <input type="checkbox"/> 1-Year post-retrofit

Last Update: 8/25/10

33. Has [CHILD’S NAME] EVER been told by a doctor or other health professional that [HE/SHE] had...

a. Any kind of respiratory allergy

- 1. Yes
- 2. No
- 97. Refused
- 99. Don't know

REPEAT QUESTION STEM AS NEEDED FOR OTHER CONDITIONS.

- b. Eczema or any kind of skin allergy**
- c. Hay fever**
- d. Chronic bronchitis**
- e. Asthma**

**34. ASK THIS QUESTION ONLY FOR HEALTH CONDITIONS THAT had an ANSWER of “YES” IN Q33:
Was this condition identified while living in the home BEFORE AND/OR AFTER the energy work was done?**

- 1. Before Weatherization
- 2. After Weatherization
- 3. Both
- 97. Refused
- 99. Don't know

Child #	Preferred Name	a. Resp. Allergy		b. Eczema/Skin Allergy		c. Hay Fever		d. Chronic Bronchitis		e. Asthma	
		Q33	Q34	Q33	Q34	Q33	Q34	Q33	Q34	Q33	Q34
Child 1											
Child 2											

IF NO CHILDREN ARE PRESENT, SKIP TO QUESTION 40.

Study ID:	Interview:
	<input type="checkbox"/> Baseline
	<input type="checkbox"/> 1-Year post-retrofit

Last Update: 8/25/10

I AM GOING TO READ A LIST OF ITEMS THAT DESCRIBE CHILDREN. FOR EACH ITEM, PLEASE TELL ME IF IT HAS BEEN NOT TRUE, SOMEWHAT TRUE, OR CERTAINLY TRUE FOR [CHILD'S NAME] DURING THE PAST SIX MONTHS.

35. [CHILD'S NAME] is generally well behaved, usually does what adults request.

- 1. Not true
- 2. Somewhat true
- 3. Certainly true
- 97. Refused
- 99. Don't know

36. During the past year, [CHILD'S NAME] has many worries, or often seems worried.

- 1. Not true
- 2. Somewhat true
- 3. Certainly true
- 97. Refused
- 99. Don't know

37. During the past year, [CHILD'S NAME] is often unhappy, depressed, or tearful.

- 1. Not true
- 2. Somewhat true
- 3. Certainly true
- 97. Refused
- 99. Don't know

38. During the past year, [CHILD'S NAME] has good attention span, sees chores or homework through to the end.

- 1. Not true
- 2. Somewhat true
- 3. Certainly true
- 97. Refused
- 99. Don't know

39. Overall, do you think that [CHILD'S NAME] has difficulties in any of the following areas: emotions, concentration, behavior, or being able to get along with other people?

- 1. No
- 2. Yes, minor difficulties
- 3. Yes, definite difficulties
- 4. Yes, severe difficulties
- 97. Refused
- 99. Don't know

Child #	Preferred Name	Well Behaved (#35)	Worried (#36)	Unhappy (#37)	Attention Span (#38)	Difficulties (#39)
Child 1						
Child 2						

Study ID:	Interview:
	<input type="checkbox"/> Baseline <input type="checkbox"/> 1-Year post-retrofit

Last Update: 8/25/10

NOW I AM GOING TO ASK ABOUT YOUR HEALTH.

THE FOLLOWING QUESTIONS ARE TO BE ASKED OF THE ADULT RESPONDENT, NOT OTHER ADULTS IN THE HOUSEHOLD.

40. Because of a physical, mental, or emotional problem, do you need the help of other persons in handling ROUTINE NEEDS, such as everyday household chores, doing necessary business, shopping, or getting around for other purposes?

- 1. Yes
- 2. No
- 97. Refused
- 99. Don't know

41. Does a physical, mental, or emotional problem NOW keep you from working at a job or business?

- 1. Yes
- 2. No
- 97. Refused
- 99. Don't know

42. Have you ever been told by a doctor or other health professional that you have...

a. Hypertension, also called high blood pressure?

- 1. Yes
- 2. No
- 97. Refused
- 99. Don't know

REPEAT QUESTION STEM AS NEEDED FOR EACH CONDITION, FOR THE ADULT.

b. Coronary heart disease

c. Angina, also called angina pectoris

d. Heart attack (also called myocardial infarction)

e. Any other kind of heart condition or heart disease

43. ASK THIS QUESTION ONLY FOR HEALTH CONDITIONS THAT had an ANSWER of "YES" IN Q42: Was this condition identified BEFORE AND/OR AFTER THE ENERGY WORK?

- 1. Before
- 2. After
- 3. Both
- 97. Refused
- 99. Don't know

Adult #	Preferred Name	a. High Blood Pressure		b. Coronary Heart Disease		c. Angina		d. Myocardial Infarction		e. Other Heart Condition/Disease	
		Q42	Q43	Q42	Q43	Q42	Q43	Q42	Q43	Q42	Q43
Adult 1											

Study ID:	Interview:
	<input type="checkbox"/> Baseline <input type="checkbox"/> 1-Year post-retrofit

Last Update: 8/25/10

44. Have you ever been told by a doctor or other health professional that you have...

a. Overweight

- 1. Yes
- 2. No
- 97. Refused
- 99. Don't know

b. Emphysema

c. Hay fever

d. Sinusitis

e. Chronic bronchitis

f. Asthma

**45. ASK THIS QUESTION ONLY FOR HEALTH CONDITIONS THAT had an ANSWER of "YES" IN Q44:
Was this condition identified BEFORE AND/OR AFTER THE ENERGY WORK WAS DONE?**

- 1. Before
- 2. After
- 3. Both
- 97. Refused
- 99. Don't know

Adult #	Preferred Name	a. Overweight		b. Emphysema		c. Hay Fever		d. Sinusitis		e. Chronic Bronchitis		f. Asthma	
		Q44	Q45	Q44	Q45	Q44	Q45	Q44	Q45	Q44	Q45	Q44	Q45
Adult 1													

SKIP IF 44F IS NO.

46. Do you still have asthma?

- 1. Yes
- 2. No [GO TO Q51]
- 97. Refused [GO TO Q51]
- 99. Don't know [GO TO Q51]

Study ID:	Interview:
	<input type="checkbox"/> Baseline <input type="checkbox"/> 1-Year post-retrofit

Last Update: 8/25/10

NOW I AM GOING TO ASK YOU SOME QUESTIONS ABOUT ASTHMA FOR YOU AND UP TO 2 CHILDREN IN THE HOME.

RECORD RESPONSES IN TABLE. CAPITALIZED YOU MEANS ONE ADULT AND UP TO TWO CHILDREN

47. SKIP THIS QUESTION FOR BASELINE INTERVIEW [ASK ONLY FOR THE 1-YEAR POST-RETROFIT INTERVIEW]: COMPARED WITH WHEN YOU WERE IN YOUR HOME BEFORE THE ENERGY WORK, would you say YOUR asthma is now better, worse, or about the same?

- 1. Better
- 2. Worse
- 3. About the same
- 4. Not applicable
- 97. Refused
- 99. Don't know

48. Symptoms of asthma include cough, wheezing, shortness of breath, chest tightness and phlegm production when YOU do not have a cold or respiratory infection. DURING THE PAST 12 MONTHS, how often have you had any symptoms of asthma? Would you say...

PLEASE READ:

- 1. Not at any time
- 2. Less than once a week
- 3. Once or twice a week
- 4. More than 2 times a week, but not every day
- 5. Every day, but not all the time
- 6. Every day, all the time

Do not read:

- 97. Refused
- 99. Don't know

49. DURING THE PAST 12 MONTHS, did YOU have to visit an emergency room or urgent care center because of asthma?

- 1. Yes
- 2. No
- 97. Refused
- 99. Don't know

50. DURING THE PAST 12 MONTHS, how many days were YOU UNABLE to attend school/work or carry out usual activities because of asthma?

_____ Number of days

- 888. None
- 97. Refused
- 99. Don't know

Adult/Child #	Preferred Name	Asthma better (#47)	Symptoms (#48)	ER visit (#49)	# days out of school/activities (#50)
Adult 1					
Child 1					
Child 2					

51. On how many of the past 30 days did any adult in your household smoke a cigarette in your home?

- 1. 00 - none
- 2. 1 to 30 days
- 97. Refused
- 99. Don't know

Study ID:	Interview:
	<input type="checkbox"/> Baseline
	<input type="checkbox"/> 1-Year post-retrofit

Last Update: 8/25/10

NOW I AM GOING TO ASK YOU SOME QUESTIONS ABOUT FEELINGS YOU MAY HAVE EXPERIENCED OVER THE PAST 30 DAYS. IN THESE QUESTIONS, I AM ONLY ASKING ABOUT YOUR EXPERIENCES.

52. During the PAST 30 DAYS, how often did you feel so sad that nothing could cheer you up?

1. ALL of the time
2. MOST of the time
3. SOME of the time
4. A LITTLE of the time
5. NONE of the time
97. Refused
99. Don't know

53. During the PAST 30 DAYS, how often did you feel nervous?

1. ALL of the time
2. MOST of the time
3. SOME of the time
4. A LITTLE of the time
5. NONE of the time
97. Refused
99. Don't know

54. During the PAST 30 DAYS, how often did you feel restless or fidgety?

1. ALL of the time
2. MOST of the time
3. SOME of the time
4. A LITTLE of the time
5. NONE of the time
97. Refused
99. Don't know

55. During the PAST 30 DAYS, how often did you feel hopeless?

1. ALL of the time
2. MOST of the time
3. SOME of the time
4. A LITTLE of the time
5. NONE of the time
97. Refused
99. Don't know

Study ID:	Interview:
	<input type="checkbox"/> Baseline <input type="checkbox"/> 1-Year post-retrofit

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56. During the PAST 30 DAYS, how often did you feel that everything was an effort?

1. ALL of the time
2. MOST of the time
3. SOME of the time
4. A LITTLE of the time
5. NONE of the time
97. Refused
99. Don't know

57. During the PAST 30 DAYS, how often did you feel worthless?

1. ALL of the time
2. MOST of the time
3. SOME of the time
4. A LITTLE of the time
5. NONE of the time
97. Refused
99. Don't know

58. We just talked about a number of feelings you had during the PAST 30 DAYS. Altogether, how MUCH did these feelings interfere with your life or activities: a lot, some, a little, or not at all?

1. A lot
2. Some
3. A little
4. Not at all
97. Refused
99. Don't know

**THE NEXT SET OF QUESTIONS IS ABOUT INJURIES AND POISONINGS THAT ARE RELATED TO THE HOUSE.
IN THESE QUESTIONS, I WILL BE ASKING ABOUT YOU AND UP TO TWO CHILDREN IN THE HOUSE.**

REPEAT EACH QUESTION FOR ONE ADULT AND UP TO TWO CHILDREN IN THE HOUSEHOLD
NOTE THAT 'YOU' IS CAPITALIZED IN QUESTIONS IF THE QUESTION IS TO BE REPEATED FOR THE ADULT AND UP TO TWO CHILDREN.

59. In the past 12 months, have YOU had an injury where any part of the body was hurt, for example, with a sprain, cut or broken arm and was serious enough for you to see medical help? IF THERE WAS MORE THAN ONE INJURY, ASK THE RESPONDENT TO PICK THE MOST SERIOUS.

1. Yes
2. No [GO TO Q63]
97. Refused [GO TO Q63]
99. Don't know [GO TO Q63]

Study ID:	Interview:
	<input type="checkbox"/> Baseline <input type="checkbox"/> 1-Year post-retrofit

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NOW I'M GOING TO ASK A FEW QUESTIONS ABOUT YOUR INJURY THAT OCCURRED AFTER THE ENERGY WORK WAS COMPLETED AND FOR WHICH A MEDICAL PROFESSIONAL WAS CONSULTED.

REPEAT FOR ADULT AND UP TO TWO CHILDREN WHO HAD AN ANSWER OF "1" OR "YES" TO Q59.

60. What were YOU doing when YOU were injured?

- | | |
|---|---|
| <ul style="list-style-type: none"> 01. Working at a paid job 02. Working around the house or yard 03. Unpaid work (such as volunteer work) 04. Sports and exercise 05. Leisure activity (excluding sports) 06. Sleeping, resting, eating, or drinking | <ul style="list-style-type: none"> 07. Cooking 08. Being cared for (hands-on care from another person) 09. Fall 10. Other, specify _____ 97. Refused 99. Don't know |
|---|---|

61. What kind of injury did YOU have?

- | | |
|--|---|
| <ul style="list-style-type: none"> 01. Broken bone or fracture 02. Sprain, strain, or twist 03. Cut 04. Scrape 05. Bruise 06. Burn | <ul style="list-style-type: none"> 07. Insect bite 08. Animal bite 09. Other, specify _____ 97. Refused 99. Don't know |
|--|---|

62. If injury caused by fall, how did YOU fall?

- | | |
|---|---|
| <ul style="list-style-type: none"> 01. Stairs, steps, or escalator 02. Floor or level ground 03. Curb (including sidewalk) 04. Ladder or scaffolding 05. Playground equipment 06. Sports field, court, or rink 07. Building or other structure | <ul style="list-style-type: none"> 08. Chair, bed, sofa, or other furniture 09. Bathtub, shower, toilet, or commode 10. Hole or other opening 11. Other, specify _____ 97. Refused 99. Don't know |
|---|---|

Adult/Child #	Preferred Name	Had injury in home (#59)	Kind of injury (#60)	What were you doing (#61)	How did you fall (#62)
Adult1					
Child 1					
Child 2					

Study ID:	Interview:
	<input type="checkbox"/> Baseline <input type="checkbox"/> 1-Year post-retrofit

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63. In the past 12 months, have YOU been poisoned by swallowing or breathing in a harmful substance such as bleach, carbon monoxide, or pesticides and therefore went to see a medical professional? Do not include food poisoning, sun poisoning, or poison ivy rashes.

- 1. Yes
- 2. No [GO TO Q65]
- 97. Refused [GO TO Q65]
- 99. Don't know [GO TO Q65]

64. What did YOUR poisoning result from?

- 1. Swallowing a drug or medical substance mistakenly or in overdose
- 2. Swallowing or touching a harmful solid or liquid substance
- 3. Inhaling harmful gases or vapors
- 4. Eating a poisonous plant or other substance mistaken for food
- 5. Being bitten by a poisonous animal
- 6. Other, please specify
- 97. Refused
- 99. Don't know

Adult/Child #	Preferred Name	Had Poisoning (#63)	Cause of Poisoning (#64)
Adult 1			
Child 1			
Child 2			

65. What is the HIGHEST level of school you completed or the highest degree you received?

* Enter highest level of school completed.

- 00. Never attended/kindergarten only
- 01. 1st grade
- 02. 2nd grade
- 03. 3rd grade
- 04. 4th grade
- 05. 5th grade
- 06. 6th grade
- 07. 7th grade
- 08. 8th grade
- 09. 9th grade
- 10. 10th grade
- 11. 11th grade
- 12. 12th grade, no diploma
- 13. GED or equivalent
- 14. High School Graduate
- 15. Some college, no degree
- 16. Associate degree: occupational, technical, or vocational program
- 17. Associate degree: academic program
- 18. Bachelor's degree (Example: BA, AB, BS, BBA)
- 19. Master's degree (Example: MA, MS, MEng, MEd, MBA)
- 20. Professional School degree (Example: MD, DDS, DVM, JD)
- 21. Doctoral degree (Example: PhD, EdD)
- 97. Refused
- 99. Don't know

Study ID:	Interview:
	_____ Baseline
	_____ 1-Year post-retrofit

Last Update: 8/25/10

66. You may not be able to give us an exact figure for your total combined family income, but can you tell me if your household's income in the past 12 months was...

* Read if necessary:

1. < \$10,000	6. \$50,000 to \$75,000
2. \$10,000 a < \$20,000	7. >75,000
3. \$20,000 a < \$30,000	97. Refused
4. \$30,000 a < \$40,000	99. Don't know
5. \$40,000 a < \$50,000	

67. Do you or any of the two children we have asked you about have any pre-existing medical condition that is not related to the condition of your housing, such as epilepsy, cystic fibrosis, work-related disease or injury, silicosis, or asbestosis? We need this information to better understand how housing condition may affect pre-existing illnesses or disease. We only need to know about up to two of the most serious conditions.

1. Yes (write in condition(s) and name of individual(s))
2. No
97. Refused
99. Don't know

Adult/Child #	Preferred Name	Illness or Disease 1	Illness or Disease 2
Adult 1			
Child 1			
Child 2			

Cohort 1 Replacement Data:

ID	Building ID	Dwelling ID	Sample Type	Sample Room	Phase 1 loading	Phase 2 loading	Phase 3 loading
B0010A1	B001	0A1	floor	LR	10	24	12
B0010A1	B001	0A1	sill	LR	<20	<23	24.5
B0010A1	B001	0A1	trough	LR	250	170	63.2
B0010A1	B001	0A1	floor	BR	<10	<10	12
B0010A1	B001	0A1	sill	BR	<31	<44	30.8
B0010A1	B001	0A1	floor	KIT	<10	11	12
B0010B1	B001	0B1	floor	LR	<10	12	12
B0010B1	B001	0B1	sill	LR	<33	<27	21.4
B0010B1	B001	0B1	trough	LR	230	570	1835
B0010B1	B001	0B1	floor	BR	<10	13	12
B0010B1	B001	0B1	sill	BR	<74	<58	92.3
B0010B1	B001	0B1	floor	KIT	<10	20	13.1
B0010B3	B001	0B3	floor	LR	11	12	
B0010B3	B001	0B3	sill	LR	<69	33	
B0010B3	B001	0B3	trough	LR	240	1200	
B0010B3	B001	0B3	floor	BR	<10	12	
B0010B3	B001	0B3	sill	BR	<55	140	
B0010B3	B001	0B3	floor	KIT	<10	10	
B0010B4	B001	0B4	floor	LR	10	32	12
B0010B4	B001	0B4	sill	LR	129.8	<72	70.6
B0010B4	B001	0B4	trough	LR	292.4	380	349.1
B0010B4	B001	0B4	floor	BR	9.8	19	12
B0010B4	B001	0B4	sill	BR	25.8	<28	37.1
B0010B4	B001	0B4	floor	KIT	9.80	25	12
B0010B5	B001	0B5	floor	LR	9.80	<10	12
B0010B5	B001	0B5	sill	LR	30.2	<23	23.1
B0010B5	B001	0B5	trough	LR	83.8	<62	84.1
B0010B5	B001	0B5	floor	BR	9.8	<10	12
B0010B5	B001	0B5	sill	BR	83.6	<34	120
B0010B5	B001	0B5	floor	KIT	9.8	21	12
B0010C5	B001	0C5	floor	LR	<10	16	
B0010C5	B001	0C5	sill	LR	49	50	
B0010C5	B001	0C5	trough	LR	310	97	
B0010C5	B001	0C5	floor	BR	<10	77	
B0010C5	B001	0C5	sill	BR	<33	350	
B0010C5	B001	0C5	floor	KIT	<10	25	
B0010D2	B001	0D2	floor	LR	<10	91	12
B0010D2	B001	0D2	sill	LR	180	210	13

B0010D2	B001	0D2	trough	LR	1300	98	14
B0010D2	B001	0D2	floor	BR	<10	20	15
B0010D2	B001	0D2	sill	BR	<110	<84	16
B0010D2	B001	0D2	floor	KIT	11	130	17
B0030A3	B003	0A3	floor	BR2	<10	1100	12
B0030A3	B003	0A3	sill	BR2	<31	190	21.4
B0030A3	B003	0A3	trough	BR2	580	740	NA
B0030A3	B003	0A3	floor	BR	<10	110	12
B0030A3	B003	0A3	sill	BR	<84	1300	16
B0030A3	B003	0A3	floor	KIT	15	56	NA
B0030A4	B003	0A4	floor	LR	<10	NA	
B0030A4	B003	0A4	sill	LR	<50	NA	
B0030A4	B003	0A4	trough	LR	580	NA	
B0030A4	B003	0A4	floor	BR	<10	17	
B0030A4	B003	0A4	sill	BR	<31	<24	
B0030A4	B003	0A4	floor	KIT	<10	<10	
B0030C2	B003	0C2	floor	LR	<10		
B0030C2	B003	0C2	sill	LR	<27		
B0030C2	B003	0C2	trough	LR	<83		
B0030C2	B003	0C2	floor	BR	<10		
B0030C2	B003	0C2	sill	BR	<27		
B0030C2	B003	0C2	floor	KIT	<10		
B0030C4	B003	0C4	floor	LR	<10	140	
B0030C4	B003	0C4	sill	LR	<21	140	
B0030C4	B003	0C4	trough	LR	130	370	
B0030C4	B003	0C4	floor	BR	<10	NA	
B0030C4	B003	0C4	sill	BR	<59	NA	
B0030C4	B003	0C4	floor	KIT	15	49	
B0030D5	B003	0D5	floor	LR	<10	410	12
B0030D5	B003	0D5	sill	LR	<130	50	24.5
B0030D5	B003	0D5	trough	LR	<110	340	89.5
B0030D5	B003	0D5	floor	BR	<10	64	NA
B0030D5	B003	0D5	sill	BR	<36	40	NA
B0030D5	B003	0D5	floor	KIT	<10	18	12
B0040A4	B004	0C2	floor	LR	<10	<10	10.1
B0040A4	B004	0C2	sill	LR	<110	59	22.5
B0040A4	B004	0C2	trough	LR			134.1
B0040A4	B004	0C2	floor	BR	<10	<10	10.1
B0040A4	B004	0C2	sill	BR	42	60	40.5
B0040A4	B004	0C2	floor	KIT	<10	29	10.1
B0040B1	B004	0B1	floor	LR	<10	<10	

B0040B1	B004	0B1	sill	LR	<33	290	
B0040B1	B004	0B1	trough	LR	460	520	
B0040B1	B004	0B1	floor	BR	<10	<10	
B0040B1	B004	0B1	sill	BR	<33	340	
B0040B1	B004	0B1	floor	KIT	<10	12	
B0040C4	B004	0C4	floor	LR	<10	<10	
B0040C4	B004	0C4	sill	LR	<37	520	
B0040C4	B004	0C4	trough	LR	150	410	
B0040C4	B004	0C4	floor	BR	<10	<10	
B0040C4	B004	0C4	sill	BR	<16	40	
B0040C4	B004	0C4	floor	KIT	<10	<10	
B005001	B005	1	floor	LR	<10	20	12
B005001	B005	1	sill	LR	<46	160	420
B005001	B005	1	trough	LR			NA
B005001	B005	1	floor	BR	<10	290	12
B005001	B005	1	sill	BR	50	53	19
B005001	B005	1	floor	KIT	<10	120	12
B005004	B005	4	floor	LR	<10	<10	12
B005004	B005	4	sill	LR	<30	<26	26
B005004	B005	4	trough	LR	580	470	450
B005004	B005	4	floor	BR	16	14	12
B005004	B005	4	sill	BR	120	190	59
B005004	B005	4	floor	KIT	290	21	12
B005006	B005	6	floor	LR	<10	55	12
B005006	B005	6	sill	LR	70	190	54
B005006	B005	6	trough	LR	210		NA
B005006	B005	6	floor	BR	<10	26	NA
B005006	B005	6	sill	BR	<180	1400	NA
B005006	B005	6	floor	KIT	<10	19	12
B005009	B005	9	floor	LR	<10	<10	
B005009	B005	9	sill	LR	<58	93	
B005009	B005	9	trough	LR		NA	
B005009	B005	9	floor	BR	<10	<10	
B005009	B005	9	sill	BR	<33	510	
B005009	B005	9	floor	KIT	<10	<10	
B005010	B005	10	floor	LR	<10	<10	12
B005010	B005	10	sill	LR	58	1800	5100
B005010	B005	10	trough	LR	910	3100	6200
B005010	B005	10	floor	BR	<10	<10	12
B005010	B005	10	sill	BR	310	NA	400
B005010	B005	10	floor	KIT	<10	<10	12
B005011	B005	11	floor	LR	<10	30	12

B005011	B005	11	sill	LR	91	520	1500
B005011	B005	11	trough	LR		1000	3200
B005011	B005	11	floor	BR	<10	60	12
B005011	B005	11	sill	BR	87	1100	250
B005011	B005	11	floor	KIT	<10	32	12
B005019	B005	19	floor	LR	<10	21	12
B005019	B005	19	sill	LR	<38	1700	400
B005019	B005	19	trough	LR	<130	NA	NA
B005019	B005	19	floor	BR	<10	64	21
B005019	B005	19	sill	BR	<42	450	300
B005019	B005	19	floor	KIT	<10	55	12
B005020	B005	20	floor	LR	<10	42	12
B005020	B005	20	sill	LR	<31	140	23
B005020	B005	20	trough	LR	<270	NA	NA
B005020	B005	20	floor	BR	<10	12	12
B005020	B005	20	sill	BR	<24	95	53
B005020	B005	20	floor	KIT	<10	38	13
B006003	B006	3	floor	LR	51	12	12
B006003	B006	3	sill	LR	38	5500	240
B006003	B006	3	trough	LR	460	1200	780
B006003	B006	3	floor	BR	<10	25	12
B006003	B006	3	sill	BR	840	100	39
B006003	B006	3	floor	KIT	<10	16	12
B006005	B006	5	floor	LR	<10	40	12
B006005	B006	5	sill	LR	28	3200	110
B006005	B006	5	trough	LR		3600	NA
B006005	B006	5	floor	BR	<10	77	12
B006005	B006	5	sill	BR	240	NA	NA
B006005	B006	5	floor	KIT	<10	66	12
B006007	B006	7	floor	LR		9.9	12
B006007	B006	7	sill	LR	73	20.4	NA
B006007	B006	7	trough	LR	23000	2060.3	NA
B006007	B006	7	floor	BR		9.9	12
B006007	B006	7	sill	BR	300	12.9	25
B006007	B006	7	floor	KIT	<10	9.9	12
B006009	B006	9	floor	LR	<10	9.9	12
B006009	B006	9	sill	LR	<410	924.5	NA
B006009	B006	9	trough	LR			NA
B006009	B006	9	floor	BR	<10	9.9	12
B006009	B006	9	sill	BR	46	323.4	34
B006009	B006	9	floor	KIT	<10	9.9	12

B006010	B006	10	floor	LR	<10	23	12
B006010	B006	10	sill	LR	650	670	51
B006010	B006	10	trough	LR	4700	3600	3700
B006010	B006	10	floor	BR	<10	28	12
B006010	B006	10	sill	BR	480	450	170
B006010	B006	10	floor	KIT	<10	59	12
B006011	B006	11	floor	LR	<10	33	12
B006011	B006	11	sill	LR	<16	140	34
B006011	B006	11	trough	LR		1500	NA
B006011	B006	11	floor	BR	<10	19	12
B006011	B006	11	sill	BR	110	840	1900
B006011	B006	11	floor	KIT	<10	210	12
B006012	B006	12	floor	LR	<10	11	12
B006012	B006	12	sill	LR	<6.9	110	22
B006012	B006	12	trough	LR			NA
B006012	B006	12	floor	BR	<10	12	12
B006012	B006	12	sill	BR	<7.2	97	180
B006012	B006	12	floor	KIT	<10	<10	12
B006014	B006	14	floor	LR	<10	14	12
B006014	B006	14	sill	LR	33	480	NA
B006014	B006	14	trough	LR	110	1700	NA
B006014	B006	14	floor	BR	<10	14	12
B006014	B006	14	sill	BR	73	4600	130
B006014	B006	14	floor	KIT	<10	14	12
B006016	B006	16	floor	LR	11	69	15
B006016	B006	16	sill	LR	270	1000	61
B006016	B006	16	trough	LR	7600	3500	490
B006016	B006	16	floor	BR	<10	110	12
B006016	B006	16	sill	BR	1200	4000	NA
B006016	B006	16	floor	KIT	39	86	12
B007001	B007	1	floor	LR	<10	12	12
B007001	B007	1	sill	LR	200	41.4	130
B007001	B007	1	trough	LR		80	80
B007001	B007	1	floor	BR	<10	12	12
B007001	B007	1	sill	BR	330	58.1	39
B007001	B007	1	floor	KIT	<10	12	12
B010001	B010	1	floor	LR	12	169.7	16
B010001	B010	1	sill	LR	52.2	143.5	270
B010001	B010	1	trough	LR		3347.4	4800
B010001	B010	1	floor	BR	14.1	111.1	12
B010001	B010	1	sill	BR	36.4	921.4	24
B010001	B010	1	floor	KIT	12	125.3	12

B010004	B010	4	floor	LR	12.5	12	12
B010004	B010	4	sill	LR	59.2	418.6	40
B010004	B010	4	trough	LR	754.3	2533.3	340
B010004	B010	4	floor	BR	12.5	12	12
B010004	B010	4	sill	BR	44.6	1240.1	150
B010004	B010	4	floor	KIT	12.5	12	12
B010005	B010	5	floor	LR	29.4	85.8	
B010005	B010	5	sill	LR	133.3	14645	
B010005	B010	5	trough	LR	2458.6	2346.7	
B010005	B010	5	floor	BR	17.1	55.8	
B010005	B010	5	sill	BR	65.5	148.1	
B010005	B010	5	floor	KIT	16.5	184.2	
B010006	B010	6	floor	LR	12.5	22.3	12
B010006	B010	6	sill	LR	34.7	146.9	230
B010006	B010	6	trough	LR	340	9638.1	1100
B010006	B010	6	floor	BR	12.5	14	12
B010006	B010	6	sill	BR	25.5	151.6	
B010006	B010	6	floor	KIT	12.5	52.4	12
B010009	B010	9	floor	LR	12	28.3	12
B010009	B010	9	sill	LR	19314.3	2222.6	1000
B010009	B010	9	trough	LR	790		500
B010009	B010	9	floor	BR	12	989.8	12
B010009	B010	9	sill	BR	56.5	26.2	82
B010009	B010	9	floor	KIT	12	12	12
B010010	B010	10	floor	LR	12	26	12
B010010	B010	10	sill	LR	1046	527.5	27
B010010	B010	10	trough	LR	6866.7	6840	1700
B010010	B010	10	floor	BR	12	17.2	12
B010010	B010	10	sill	BR	31.3	121.1	370
B010010	B010	10	floor	KIT	12	40.2	12
B010012	B010	12	floor	LR	12	12	12
B010012	B010	12	sill	LR	31.2	66.7	29
B010012	B010	12	trough	LR	88.8	8036.8	160
B010012	B010	12	floor	BR	12	12	12
B010012	B010	12	sill	BR	29.3	1340	28
B010012	B010	12	floor	KIT	12	54.2	12
B010021	B010	21	floor	LR	12	36.5	12
B010021	B010	21	sill	LR	34.3	52	29
B010021	B010	21	trough	LR	924.3	2768.4	1100
B010021	B010	21	floor	BR	12	18.1	12
B010021	B010	21	sill	BR	27.3	42.1	120

B010021	B010	21	floor	KIT	12	45.4	12
B010022	B010	22	floor	LR	12	76.4	
B010022	B010	22	sill	LR	41.4	2185.7	
B010022	B010	22	trough	LR		796.5	
B010022	B010	22	floor	BR	12	52.8	
B010022	B010	22	sill	BR	169.2	4169.2	
B010022	B010	22	floor	KIT	12	118.5	
B010023	B010	23	floor	LR	12	65	
B010023	B010	23	sill	LR	17.9	271.8	
B010023	B010	23	trough	LR	185.8	410	
B010023	B010	23	floor	BR	12	77.2	
B010023	B010	23	sill	BR	19.9	122.1	
B010023	B010	23	floor	KIT	12	150.8	
B011001	B011	1	floor	LR	12	215.7	12
B011001	B011	1	sill	LR	54.5	6833.3	43
B011001	B011	1	trough	LR	1528.3	1820	63
B011001	B011	1	floor	BR	12	196.7	20
B011001	B011	1	sill	BR	66.7	996.2	41
B011001	B011	1	floor	KIT	20.9	207.8	12
B011005	B011	5	floor	LR	12	48	
B011005	B011	5	sill	LR	75	1496.4	
B011005	B011	5	trough	LR	1053.3	4426.3	
B011005	B011	5	floor	BR	12	1691	
B011005	B011	5	sill	BR	152.5	322.4	
B011005	B011	5	floor	KIT	12	53.2	
B011016	B011	16	floor	LR	12	36.8	12
B011016	B011	16	sill	LR	647.1	1008	190
B011016	B011	16	trough	LR	2840	1140	140
B011016	B011	16	floor	BR	12	18.1	43
B011016	B011	16	sill	BR	30.8	360.9	160
B011016	B011	16	floor	KIT	12	84	12
B011018	B011	18	floor	LR	12	90.4	
B011018	B011	18	sill	LR	24	214.4	
B011018	B011	18	trough	LR		7840	
B011018	B011	18	floor	BR	12	29.3	
B011018	B011	18	sill	BR	349.1	524.3	
B011018	B011	18	floor	KIT	12	62.3	
B011021	B011	21	floor	LR	15	307	12
B011021	B011	21	sill	LR	16	1361.5	43
B011021	B011	21	trough	LR	333.6	5322.2	130
B011021	B011	21	floor	BR	23.2	241.7	12
B011021	B011	21	sill	BR	143.9	1122.7	46

B011021	B011	21	floor	KIT	46.8	428	12
B012002	B012	2	floor	LR	12		
B012002	B012	2	sill	LR	417.8	122.6	
B012002	B012	2	trough	LR	1202	66.2	
B012002	B012	2	floor	BR	314		
B012002	B012	2	sill	BR	952.9		
B012002	B012	2	floor	KIT	25.6		
B012004	B012	4	floor	LR	12.5	16	12
B012004	B012	4	sill	LR	40.3	462.1	52
B012004	B012	4	trough	LR	240.9	776.8	
B012004	B012	4	floor	BR	12.5	20.9	12
B012004	B012	4	sill	BR	30.8	134.1	27
B012004	B012	4	floor	KIT	15.6	160.4	12
B012005	B012	005	floor	LR			12
B012005	B012	005	sill	LR			39
B012005	B012	005	trough	LR			1500
B012005	B012	005	floor	BR			12
B012005	B012	005	sill	BR			50
B012005	B012	005	floor	KIT			12
B012006	B012	6	floor	LR	12	14.1	12
B012006	B012	6	sill	LR	207.7	339.8	44
B012006	B012	6	trough	LR	2803.8	2823.8	1600
B012006	B012	6	floor	BR	12	31	12
B012006	B012	6	sill	BR	21.4		
B012006	B012	6	floor	KIT	12	34.2	12
B012008	B012	8	floor	LR	12	137.2	12
B012008	B012	8	sill	LR	31.7	276.9	67
B012008	B012	8	trough	LR	294.6	2200	1300
B012008	B012	8	floor	BR	12	78.6	12
B012008	B012	8	sill	BR	54.5	400	180
B012008	B012	8	floor	KIT	12	160.2	12
B012014	B012	14	floor	LR	37.3	34.2	12
B012014	B012	14	sill	LR	29.3	129.8	24
B012014	B012	14	trough	LR	1734.5	6688.9	200
B012014	B012	14	floor	BR	15.4	54.7	12
B012014	B012	14	sill	BR	59.8	163.8	
B012014	B012	14	floor	KIT	33	84.7	12
B01205R	B012	05R	floor	LR	12	12	
B01205R	B012	05R	sill	LR	47.5	341.7	
B01205R	B012	05R	trough	LR	14963	4664.3	
B01205R	B012	05R	floor	BR	12	12.4	

B01205R	B012	05R	sill	BR	27.4	754.8	
B01205R	B012	05R	floor	KIT	12	12	
B0130B1	B013	0B1	floor	LR	12.5		
B0130B1	B013	0B1	sill	LR	30.5		
B0130B1	B013	0B1	trough	LR	147.1		
B0130B1	B013	0B1	floor	BR	12.5		
B0130B1	B013	0B1	sill	BR	89		
B0130B1	B013	0B1	floor	KIT	12.5		
B0130B2	B013	0B2	floor	LR	13.2	144.7	20
B0130B2	B013	0B2	sill	LR	1084	7974.4	99
B0130B2	B013	0B2	trough	LR	3410	4860	790
B0130B2	B013	0B2	floor	BR	12	65.4	13
B0130B2	B013	0B2	sill	BR	233.9	2056.4	29
B0130B2	B013	0B2	floor	KIT	26.8	160.8	16
B0130B3	B013	0B3	floor	LR	12		
B0130B3	B013	0B3	sill	LR	13		
B0130B3	B013	0B3	trough	LR			
B0130B3	B013	0B3	floor	BR	12		
B0130B3	B013	0B3	sill	BR	44.2		
B0130B3	B013	0B3	floor	KIT	12		
B0130C2	B013	0C2	floor	LR	12	12	12
B0130C2	B013	0C2	sill	LR	48.6	106	74
B0130C2	B013	0C2	trough	LR	1150	1324	690
B0130C2	B013	0C2	floor	BR	12	12	12
B0130C2	B013	0C2	sill	BR	1076.7	219	36
B0130C2	B013	0C2	floor	KIT	12	27.3	12
B0130D2	B013	0D2	floor	LR	12.5	46.2	
B0130D2	B013	0D2	sill	LR	37.9	242	
B0130D2	B013	0D2	trough	LR		605.7	
B0130D2	B013	0D2	floor	BR	12.5	178.9	
B0130D2	B013	0D2	sill	BR	80.8	87.8	
B0130D2	B013	0D2	floor	KIT	12.5	32.5	
B0140A2	B014	0A2	floor	LR	239	12	12
B0140A2	B014	0A2	sill	LR	386.6	48	83
B0140A2	B014	0A2	trough	LR	109.1		660
B0140A2	B014	0A2	floor	BR	12	12	12
B0140A2	B014	0A2	sill	BR	9.7		38
B0140A2	B014	0A2	floor	KIT	12	12	12
B0140A3	B014	0A3	floor	LR	12.5	12	12
B0140A3	B014	0A3	sill	LR	26.6	28.6	33
B0140A3	B014	0A3	trough	LR		1400	55
B0140A3	B014	0A3	floor	BR	12.5	12	12

B0140A3	B014	0A3	sill	BR	34.7	267.2	31
B0140A3	B014	0A3	floor	KIT	14.7	12	12
B0140A4	B014	0A4	floor	LR	12.5	282	
B0140A4	B014	0A4	sill	LR	244.2	1864	
B0140A4	B014	0A4	trough	LR		5477.3	
B0140A4	B014	0A4	floor	BR	12.5	154.2	
B0140A4	B014	0A4	sill	BR	364.8		
B0140A4	B014	0A4	floor	KIT	13.2	223.8	
B0140B1	B014	0B1	floor	LR	12.5	12	12
B0140B1	B014	0B1	sill	LR	3158.8	948.1	1300
B0140B1	B014	0B1	trough	LR		1363.2	1400
B0140B1	B014	0B1	floor	BR	12.5	32.7	12
B0140B1	B014	0B1	sill	BR	79	561.3	62
B0140B1	B014	0B1	floor	KIT	12.5	21.1	12
B0140B3	B014	0B3	floor	LR	12.4	12	12
B0140B3	B014	0B3	sill	LR	1356.7	79.5	100
B0140B3	B014	0B3	trough	LR	120	4380	5100
B0140B3	B014	0B3	floor	BR	45.8	12	12
B0140B3	B014	0B3	sill	BR	133.3	137.1	46
B0140B3	B014	0B3	floor	KIT	12	42.7	12
B0140C1	B014	0C1	floor	LR	12.5	15	
B0140C1	B014	0C1	sill	LR	1648.3	258.8	
B0140C1	B014	0C1	trough	LR	861	3013.6	
B0140C1	B014	0C1	floor	BR	12.5	182.8	
B0140C1	B014	0C1	sill	BR	158.3	440	
B0140C1	B014	0C1	floor	KIT	12.5	27	
B0140D2	B014	0D2	floor	LR	12.5	12.6	12
B0140D2	B014	0D2	sill	LR	59.5	60	18
B0140D2	B014	0D2	trough	LR	986.3	308.1	180
B0140D2	B014	0D2	floor	BR	12.5	12.6	14
B0140D2	B014	0D2	sill	BR	25	98	19
B0140D2	B014	0D2	floor	KIT	12.5	15.3	12
B0150A1	B015	0A1	floor	LR	41.6	223.7	45
B0150A1	B015	0A1	sill	LR	31.6	591.4	18
B0150A1	B015	0A1	trough	LR	622.7	1950	41
B0150A1	B015	0A1	floor	BR	40.7	1205	120
B0150A1	B015	0A1	sill	BR	74.5	13689.7	27
B0150A1	B015	0A1	floor	KIT	29.2	552	190
B0150A4	B015	0A4	floor	LR	12	16.2	12
B0150A4	B015	0A4	sill	LR	27.3	287.6	33
B0150A4	B015	0A4	trough	LR	548.5	2885.7	210

B0150A4	B015	0A4	floor	BR	12	35.2	12
B0150A4	B015	0A4	sill	BR	26.1	88.9	
B0150A4	B015	0A4	floor	KIT	12	32.5	12
B0150B1	B015	0B1	floor	LR	12	12	12
B0150B1	B015	0B1	sill	LR	133.3		86
B0150B1	B015	0B1	trough	LR	1107.8	213.9	1000
B0150B1	B015	0B1	floor	BR		49.2	12
B0150B1	B015	0B1	sill	BR	37.5	28.6	44
B0150B1	B015	0B1	floor	KIT	12	29.9	12
B0150B4	B015	0B4	floor	LR	12	12	12
B0150B4	B015	0B4	sill	LR	133.3	501.7	430
B0150B4	B015	0B4	trough	LR		818.3	2000
B0150B4	B015	0B4	floor	BR	12	12	12
B0150B4	B015	0B4	sill	BR	26.1	2314.3	29
B0150B4	B015	0B4	floor	KIT	12	35	12
B0150C2	B015	0C2	floor	LR	12	200.9	22
B0150C2	B015	0C2	sill	LR	41.4	141	87
B0150C2	B015	0C2	trough	LR			
B0150C2	B015	0C2	floor	BR	12	32.4	280
B0150C2	B015	0C2	sill	BR	50	42.5	32
B0150C2	B015	0C2	floor	KIT	12	27.5	12
B0150D1	B015	0D1	floor	LR	12	12.3	12
B0150D1	B015	0D1	sill	LR	23.1	64.4	39
B0150D1	B015	0D1	trough	LR	47.4	2878.9	190
B0150D1	B015	0D1	floor	BR	12	57.9	12
B0150D1	B015	0D1	sill	BR	75.2	35.3	31
B0150D1	B015	0D1	floor	KIT	12	12.1	12
B0150D2	B015	0D2	floor	LR	12	12	12
B0150D2	B015	0D2	sill	LR	21.4	179.4	36
B0150D2	B015	0D2	trough	LR	452.9	752.3	480
B0150D2	B015	0D2	floor	BR	12	12	12
B0150D2	B015	0D2	sill	BR	37.5	35.4	57
B0150D2	B015	0D2	floor	KIT	12	12	12
B0150D4	B015	0D4	floor	LR	12.5	29.6	12
B0150D4	B015	0D4	sill	LR	21.6	19	25
B0150D4	B015	0D4	trough	LR	56.5	3855.6	140
B0150D4	B015	0D4	floor	BR	12.5	31.8	25
B0150D4	B015	0D4	sill	BR	29.8	46.4	43
B0150D4	B015	0D4	floor	KIT	12.5	41.5	12
B018003	B018	3	floor	LR	12	12	12
B018003	B018	3	sill	LR	66.7	22.2	31
B018003	B018	3	trough	LR	175.5	120	270

B018003	B018	3	floor	BR	12	12	12
B018003	B018	3	sill	BR	70.6	85.7	110
B018003	B018	3	floor	KIT	12	12	12
B018014	B018	14	floor	LR	12	12	12
B018014	B018	14	sill	LR	92.3	12	67
B018014	B018	14	trough	LR	230.8	190	250
B018014	B018	14	floor	BR	12	12	12
B018014	B018	14	sill	BR	100	12	75
B018014	B018	14	floor	KIT	12	15.2	12
B018021	B018	21	floor	LR	12	12	12
B018021	B018	21	sill	LR	28.6	21.1	41
B018021	B018	21	trough	LR	55.8	750.9	110
B018021	B018	21	floor	BR	12	12	12
B018021	B018	21	sill	BR	200	31.6	92
B018021	B018	21	floor	KIT	12	12	12
B018025	B018	25	floor	LR	12	28	12
B018025	B018	25	sill	LR	48	20	22
B018025	B018	25	trough	LR	92.3	506.8	48
B018025	B018	25	floor	BR	12	12	19
B018025	B018	25	sill	BR	50	25.9	28
B018025	B018	25	floor	KIT	12	15	12
Q008001	Q008	1	floor	LR	<10	<10	12
Q008001	Q008	1	sill	LR	<39	<94	48
Q008001	Q008	1	trough	LR		<75	NA
Q008001	Q008	1	floor	BR	<10	<10	12
Q008001	Q008	1	sill	BR	<32	<110	43
Q008001	Q008	1	floor	KIT	<10	<10	12
Q009001	Q009	1	floor	LR	12	12	
Q009001	Q009	1	sill	LR	40	133.3	
Q009001	Q009	1	trough	LR	26000	54.4	
Q009001	Q009	1	floor	BR	17	65.6	
Q009001	Q009	1	sill	BR			
Q009001	Q009	1	floor	KIT	44	41.6	
Q009002	Q009	2	floor	LR	<10	100	
Q009002	Q009	2	sill	LR	<18	200	
Q009002	Q009	2	trough	LR	<56	12	
Q009002	Q009	2	floor	BR	<10	86	
Q009002	Q009	2	sill	BR	22	200	
Q009002	Q009	2	floor	KIT	<10	120	

Cohort 2 Repair Data:

ID	Buildin g ID	Dwellin g ID	Sample Type	Sample Room	Phase 1 loading	Phase 2 loading	Phase 3 loading
U015001	U015	015	floor	LR	<20	<20	<20
U015001	U015	015	sill	LR	<53	<53.33	<20
U015001	U015	015	trough	LR	152.38	<73.80	525.59
U015001	U015	015	floor	BR	<20	<20	<20
U015001	U015	015	sill	BR	512.76	<73.80	220.84
U015001	U015	015	floor	KIT	<20	<20	<20
U016001	U016	001	floor	LR		32.65	
U016001	U016	001	sill	LR		<68.49	
U016001	U016	001	trough	LR		<56.50	
U016001	U016	001	floor	BR		<20	
U016001	U016	001	sill	BR		<68.49	
U016001	U016	001	floor	KIT		25.10	
U106001	U106	106	floor	LR	<20		
U106001	U106	106	sill	LR	<80		
U106001	U106	106	trough	LR	<87.34		
U106001	U106	106	floor	BR	<20		
U106001	U106	106	sill	BR	<80		
U106001	U106	106	floor	KIT	<20		
U111119	U111	119	floor	LR	<20		
U111119	U111	119	sill	LR	<119.76		
U111119	U111	119	trough	LR	293.52		
U111119	U111	119	floor	BR	<20		
U111119	U111	119	sill	BR	<119.76		
U111119	U111	119	floor	KIT	<20		
U121001	U121	001	floor	LR	160	<20	
U121001	U121	001	sill	LR	3,500	<68.493	
U121001	U121	001	trough	LR	18000	83.07	
U121001	U121	001	floor	BR	270	<20	
U121001	U121	001	sill	BR	5500	<68.493	
U121001	U121	001	floor	KIT	420	<20	
U126002	U126	002	floor	LR	24.66	<20	
U126002	U126	002	sill	LR	613.75	<87.34	
U126002	U126	002	trough	LR	529.23	<87.34	
U126002	U126	002	floor	BR	<20	<20	
U126002	U126	002	sill	BR	<160	<160	
U126002	U126	002	floor	KIT	<20	<20	
U133001	U133	133	floor	LR	BRL	37.68	
U133001	U133	133	sill	LR	786	241.51	

U133001	U133	133	trough	LR	32200		
U133001	U133	133	floor	BR	BRL	20.62	
U133001	U133	133	sill	BR	1800	713.65	
U133001	U133	133	floor	KIT	BRL	77.54	
U138001	U138	001	floor	LR	<20	<20	
U138001	U138	001	sill	LR	9,534.56	<73.80	
U138001	U138	001	trough	LR	28,783.90	<56.50	
U138001	U138	001	floor	BR	22.76	<20	
U138001	U138	001	sill	BR	<76.92	78.98	
U138001	U138	001	floor	KIT	65.01	24.69	
U140140	U140	140	floor	LR	<20		
U140140	U140	140	sill	LR	209.60		
U140140	U140	140	trough	LR	589.43		
U140140	U140	140	floor	BR	<20		
U140140	U140	140	sill	BR	10,053.64		
U140140	U140	140	floor	KIT	<20		
U1411D0	U141	1D0	floor	LR		300.11	<20
U1411D0	U141	1D0	sill	LR		<60.06	486.82
U1411D0	U141	1D0	trough	LR		<96.15	<20
U1411D0	U141	1D0	floor	BR		31.46	<20
U1411D0	U141	1D0	sill	BR		<56.50	<20
U1411D0	U141	1D0	floor	KIT		38.26	<20
U1412A0	U141	2A0	floor	LR		62.84	<20
U1412A0	U141	2A0	sill	LR		137.94	<20
U1412A0	U141	2A0	trough	LR		1766.24	434.71
U1412A0	U141	2A0	floor	BR		24.44	<20
U1412A0	U141	2A0	sill	BR		<63.90	<20
U1412A0	U141	2A0	floor	KIT			<20
U1412C0	U141	2C0	floor	LR		<20	<20
U1412C0	U141	2C0	sill	LR		1556.10	<20
U1412C0	U141	2C0	trough	LR		2371.84	<20
U1412C0	U141	2C0	floor	BR		<20	<20
U1412C0	U141	2C0	sill	BR		91.87	<20
U1412C0	U141	2C0	floor	KIT		<20	<20
U1412E0	U141	2E0	floor	LR		<20	<20
U1412E0	U141	2E0	sill	LR		786.18	<20
U1412E0	U141	2E0	trough	LR		<91.32	<20
U1412E0	U141	2E0	floor	BR		<20	<20
U1412E0	U141	2E0	sill	BR		<60.06	<20

U1412E0	U141	2E0	floor	KIT		<20	<20
U1413A0	U141	3A0	floor	LR		<20	<20
U1413A0	U141	3A0	sill	LR		<73.80	<20
U1413A0	U141	3A0	trough	LR		<96.15	<20
U1413A0	U141	3A0	floor	BR		<20	<20
U1413A0	U141	3A0	sill	BR		<63.9	<20
U1413A0	U141	3A0	floor	KIT		<20	<20
U1413C0	U141	3C0	floor	LR		<20	<20
U1413C0	U141	3C0	sill	LR		<60.06	<20
U1413C0	U141	3C0	trough	LR		<20	<20
U1413C0	U141	3C0	floor	BR		<20	<20
U1413C0	U141	3C0	sill	BR		<20	<20
U1413C0	U141	3C0	floor	KIT		36.95	<20
U146002	U146	002	floor	LR		21.94	
U146002	U146	002	sill	LR		201.26	
U146002	U146	002	trough	LR		2247.71	
U146002	U146	002	floor	BR		22.25	
U146002	U146	002	sill	BR		342.59	
U146002	U146	002	floor	KIT		<20	
U151151	U151	151	floor	LR	<20	<20	<20
U151151	U151	151	sill	LR	2900	28.95	1070.01
U151151	U151	151	trough	LR	210	<80	125.72
U151151	U151	151	floor	BR	<20	<20	<20
U151151	U151	151	sill	BR	280	<63.90	<20
U151151	U151	151	floor	KIT	<20	<20	<20
U151151 7	U15100 1	1517	floor	LR	22	<20	<20
U151151 7	U15100 1	1517	sill	LR	1000	<58.14	<20
U151151 7	U15100 1	1517	trough	LR	1200	<45.66	<20
U151151 7	U15100 1	1517	floor	BR	76	40.33	<20
U151151 7	U15100 1	1517	sill	BR	2100	<40	<20
U151151 7	U15100 1	1517	floor	KIT	44	45.90	<20
U152001	U152	001	floor	LR	60.34	<20	<20
U152001	U152	001	sill	LR	555.10	<71.17	<20
U152001	U152	001	trough	LR	27,657. 78	101.01	<20
U152001	U152	001	floor	BR	84.39	<20	<20
U152001	U152	001	sill	BR	10,515. 89	<73.80	107.81

U152001	U152	001	floor	KIT	28.39	<20	<20
U152002	U152	002	floor	LR	<20	<20	<20
U152002	U152	002	sill	LR	473.22	252.03	<20
U152002	U152	002	trough	LR	5750.45	<80	<20
U152002	U152	002	floor	BR	<20	<20	<20
U152002	U152	002	sill	BR	<96.15	<96.15	85.98
U152002	U152	002	floor	KIT	<20	<20	<20
U153001	U153	001	floor	LR	47	<20	
U153001	U153	001	sill	LR	3200	130.88	
U153001	U153	001	trough	LR	20000	<56.50	
U153001	U153	001	floor	BR	<20	<20	
U153001	U153	001	sill	BR	220	897.26	
U153001	U153	001	floor	KIT	31	<20	
U155001	U155	155	floor	LR	26	26.52	
U155001	U155	155	sill	LR	96	<63.90	
U155001	U155	155	trough	LR	11200	<96.15	
U155001	U155	155	floor	BR	21	<20	
U155001	U155	155	sill	BR	911	<63.90	
U155001	U155	155	floor	KIT	28	233.72	
U158581	U158	581	floor	LR	<20	<20	<20
U158581	U158	581	sill	LR	184.09	<68.49	<20
U158581	U158	581	trough	LR	2223.18	182.98	454.58
U158581	U158	581	floor	BR	<20	<20	<20
U158581	U158	581	sill	BR	<68.49	<68.49	86.99
U158581	U158	581	floor	KIT	<20	<20	<20
U164001	U164	001	floor	LR	<20	<20	<20
U164001	U164	001	sill	LR	470	<66.22	<20
U164001	U164	001	trough	LR	5900		<20
U164001	U164	001	floor	BR	<20	<20	<20
U164001	U164	001	sill	BR	540	<66.22	<20
U164001	U164	001	floor	KIT	<20		<20
U166001	U166	166	floor	LR	<20	<20	
U166001	U166	166	sill	LR	94.28	228.85	
U166001	U166	166	trough	LR	5149	867.08	
U166001	U166	166	floor	BR	<20	<20	
U166001	U166	166	sill	BR	835.25	327.58	
U166001	U166	166	floor	KIT	<20	282.65	
U176001	U176	001	floor	LR	<20		
U176001	U176	001	sill	LR	156.28		
U176001	U176	001	trough	LR	945.88		

U176001	U176	001	floor	BR	<20		
U176001	U176	001	sill	BR	<91.32		
U176001	U176	001	floor	KIT	<20		
U180001	U180	018	floor	LR	38.55		
U180001	U180	018	sill	LR	14909		
U180001	U180	018	trough	LR	2590.68		
U180001	U180	018	floor	BR	158.84		
U180001	U180	018	sill	BR	3338.91		
U180001	U180	018	floor	KIT	68.87		
U201001	1U201	1	floor	LR	120		
U201001	1U201	1	sill	LR	60000		
U201001	1U201	1	trough	LR	<140		
U201001	1U201	1	floor	BR	450		
U201001	1U201	1	sill	BR	1900		
U201001	1U201	1	floor	KIT	88		
U202002	1U202	2	floor	LR	76		
U202002	1U202	2	sill	LR	760		
U202002	1U202	2	trough	LR	71000		
U202002	1U202	2	floor	BR	85		
U202002	1U202	2	sill	BR	94		
U202002	1U202	2	floor	KIT	50		
U205003	1U205	3	floor	LR	160		
U205003	1U205	3	sill	LR	210		
U205003	1U205	3	trough	LR	130000		
U205003	1U205	3	floor	BR	150		
U205003	1U205	3	sill	BR	550		
U205003	1U205	3	floor	KIT	230		
U211001	U211	001	floor	LR	<20		<20
U211001	U211	001	sill	LR	<74		<20
U211001	U211	001	trough	LR	380		<20
U211001	U211	001	floor	BR	<20		<20
U211001	U211	001	sill	BR	<74		<20
U211001	U211	001	floor	KIT	<20		<20
U213A00 4	1U213A	4	floor	LR	280		
U213A00 4	1U213A	4	sill	LR	3000		
U213A00 4	1U213A	4	trough	LR	6500		
U213A00 4	1U213A	4	floor	BR	300		
U213A00 4	1U213A	4	sill	BR	1600		

U213A00 4	1U213A	4	floor	KIT	51		
U213B00 5	1U213B	5	floor	LR	68		
U213B00 5	1U213B	5	sill	LR	4300		
U213B00 5	1U213B	5	trough	LR	11000		
U213B00 5	1U213B	5	floor	BR	300		
U213B00 5	1U213B	5	sill	BR	6600		
U213B00 5	1U213B	5	floor	KIT	83		
U301001	U301	301	floor	LR	<20	<20	<20
U301001	U301	301	sill	LR	<68.49	<68.49	<20
U301001	U301	301	trough	LR	846.51	183.54	<20
U301001	U301	301	floor	BR	63.44	<20	<20
U301001	U301	301	sill	BR	<68.49	<68.49	<20
U301001	U301	301	floor	KIT	<20	<20	<20
U304006	1U304	6	floor	LR	110		
U304006	1U304	6	sill	LR	780		
U304006	1U304	6	trough	LR	73000		
U304006	1U304	6	floor	BR	33		
U304006	1U304	6	sill	BR	1800		
U304006	1U304	6	floor	KIT	40		
U308308	U308	308	floor	LR	<20	<20	
U308308	U308	308	sill	LR	2297	<136.99	
U308308	U308	308	trough	LR	27245	465.89	
U308308	U308	308	floor	BR	<20	<20	
U308308	U308	308	sill	BR	<96.15	<80	
U308308	U308	308	floor	KIT	<20	<20	
U311007	U311	7	floor	LR	64		
U311007	U311	7	sill	LR	43		
U311007	U311	7	trough	LR	16000		
U311007	U311	7	floor	BR	57		
U311007	U311	7	sill	BR	1900		
U311007	U311	7	floor	KIT	68		
U312010	U312	10	floor	LR	<20		
U312010	U312	10	sill	LR	<53		
U312010	U312	10	trough	LR	390		
U312010	U312	10	floor	BR	<20		
U312010	U312	10	sill	BR	1600		

U312010	U312	10	floor	KIT	<20		
U312010	U312	10			<20		
U403001	U430	001	floor	LR	<20	<20	<20
U403001	U430	001	sill	LR	<49	<49.26	<20
U403001	U430	001	trough	LR	8300	101.91	<20
U403001	U430	001	floor	BR	<20	<20	<20
U403001	U430	001	sill	BR	170	<83.33	<20
U403001	U430	001	floor	KIT	<20	<20	<20
U432001	U432	342	floor	LR	31.83	<20	
U432001	U432	342	sill	LR	727.91	263.52	
U432001	U432	342	trough	LR	17713.90	<80	
U432001	U432	342	floor	BR	<20	<20	
U432001	U432	342	sill	BR	96.59999999999999	<80	
U432001	U432	342	floor	KIT	<20	<20	
U510009	1U510	9	floor	LR	64		
U510009	1U510	9	sill	LR	890		
U510009	1U510	9	trough	LR	28000		
U510009	1U510	9	floor	BR	61		
U510009	1U510	9	sill	BR	1400		
U510009	1U510	9	floor	KIT	23		
U510009	1U510	9			29		
U5175172	U517001	5172	floor	LR	<20	<20	<20
U5175172	U517001	5172	sill	LR	4900	<91.32	<20
U5175172	U517001	5172	trough	LR	10000	410.49	370.84
U5175172	U517001	5172	floor	BR	<20	<20	<20
U5175172	U517001	5172	sill	BR	350	76.80	<20
U5175172	U517001	5172	floor	KIT	<20	<20	<20
U518518	U518001	518	floor	LR	<20	<20	<20
U518518	U518001	518	sill	LR	277.23	<73.80	273.33
U518518	U518001	518	trough	LR	9327.34	58,893.91	3228.01
U518518	U518001	518	floor	BR	<20	<20	<20
U518518	U518001	518	sill	BR	1219.66	<73.80	<20

U518518	U51800 1	518	floor	KIT	<20	<20	<20
U532001	U532	001	floor	LR	<20	<20	
U532001	U532	001	sill	LR	1400	413.93	
U532001	U532	001	trough	LR	52000	1046	
U532001	U532	001	floor	BR	<20	<20	
U532001	U532	001	sill	BR	240	<73.80	
U532001	U532	001	floor	KIT	<20	<20	
U538002	U538	002	floor	LR	<20	<20	
U538002	U538	002	sill	LR	118.33	<20	
U538002	U538	002	trough	LR	<96.15	<20	
U538002	U538	002	floor	BR	<20	<20	
U538002	U538	002	sill	BR	<112.99	<20	
U538002	U538	002	floor	KIT	<20	<20	
U610002	U610	002	floor	LR	<20		
U610002	U610	002	sill	LR	<80		
U610002	U610	002	trough	LR	1700		
U610002	U610	002	floor	BR	<20		
U610002	U610	002	sill	BR	<80		
U610002	U610	002	floor	KIT	<20		
U612612	U612	612	floor	LR	22.94	<20	<20
U612612	U612	612	sill	LR	328.93	<63.90	<20
U612612	U612	612	trough	LR	297.22	<73.80	<20
U612612	U612	612	floor	BR	23.27	<20	<20
U612612	U612	612	sill	BR	197.05	<68.49	<20
U612612	U612	612	floor	KIT	34.68	<20	<20
U627001	U627	162	floor	LR	<20	<20	
U627001	U627	162	sill	LR	<83.33	<83.33	
U627001	U627	162	trough	LR	552.33	117.82	
U627001	U627	162	floor	BR	<20	<20	
U627001	U627	162	sill	BR	619.37	<87.34	
U627001	U627	162	floor	KIT	<20	33.03	
U720001	U720	1	floor	LR	<20		
U720001	U720	1	sill	LR	<136.99		
U720001	U720	1	trough	LR	3034.08		
U720001	U720	1	floor	BR	<20		
U720001	U720	1	sill	BR	91.32		
U720001	U720	1	floor	KIT	<20		
U731001	U731	001	floor	LR	82.34	<20	<20
U731001	U731	001	sill	LR	644.88	<101.1	<20
U731001	U731	001	trough	LR	687.03	1186.90	594.42

U731001	U731	001	floor	BR	113.09	<20	<20
U731001	U731	001	sill	BR	559.04	<63.90	<20
U731001	U731	001	floor	KIT	146.57	<20	<20
U731002	U731	002	floor	LR	28.86	<20	<20
U731002	U731	002	sill	LR	556.22	<87.34	<20
U731002	U731	002	trough	LR	845.84	23.93	<20
U731002	U731	002	floor	BR	<20	62.49	<20
U731002	U731	002	sill	BR	724.75	<91.32	159.25
U731002	U731	002	floor	KIT	24.59	42.33	<20
U749001	U749	749	floor	LR	35.11		
U749001	U749	749	sill	LR	471.70		
U749001	U749	749	trough	LR	644.22		
U749001	U749	749	floor	BR	<20		
U749001	U749	749	sill	BR	172.66		
U749001	U749	749	floor	KIT	40.46		
U800008	U800	008	floor	LR	<20		
U800008	U800	008	sill	LR	<73.8		
U800008	U800	008	trough	LR	<96.15		
U800008	U800	008	floor	BR	48.95		
U800008	U800	008	sill	BR	141.84		
U800008	U800	008	floor	KIT	<20		
U810001	U810	810	floor	LR	<20		
U810001	U810	810	sill	LR	167.85		
U810001	U810	810	trough	LR	15,512.19		
U810001	U810	810	floor	BR	<20		
U810001	U810	810	sill	BR	87.12		
U810001	U810	810	floor	KIT	<20		
U822002	U822	002	floor	LR	2.9	<20	<20
U822002	U822	002	sill	LR	124.80	<96.15	<20
U822002	U822	002	trough	LR	10200	5807.78	<20
U822002	U822	002	floor	BR	17	<20	<20
U822002	U822	002	sill	BR	7.09	<45.66	<20
U822002	U822	002	floor	KIT	2.60	<20	<20
U888001	U888	30	floor	LR	BRL		
U888001	U888	30	sill	LR	1060		
U888001	U888	30	trough	LR	17,100		
U888001	U888	30	floor	BR	BRL		
U888001	U888	30	sill	BR	BRL		
U888001	U888	30	floor	KIT	BRL		
U960001	U690	609	floor	LR		21.22	
U960001	U690	609	sill	LR		<20	

U960001	U690	609	trough	LR			
U960001	U690	609	floor	BR		<20	
U960001	U690	609	sill	BR		<20	
U960001	U690	609	floor	KIT		<20	

Cohort 3 Control Data:

ID	Buildin g ID	Dwelling ID	Sample Type	Sample Room	Phase 1 loading	Phase 2 loading	Phase 3 loading
U431109	U431	109	floor	LR	570	94	44
U431109	U431	109	sill	LR	1230	240	2405.3
U431109	U431	109	trough	LR	9750	NA	12725.08
U431109	U431	109	floor	BR	693	55	50.35
U431109	U431	109	sill	BR	796	4200	386.38
U431109	U431	109	floor	KIT	245	24	26.9
U431110	U431	110	floor	LR	116	400	<20
U431110	U431	110	sill	LR	94	210	743.48
U431110	U431	110	trough	LR	18200	30000	6933.44
U431110	U431	110	floor	BR	78	260	29.15
U431110	U431	110	sill	BR	403	5600	401.32
U431110	U431	110	floor	KIT	267	92	26.19
U431201	U431	201	floor	LR	224	260	309.59
U431201	U431	201	sill	LR	686	1600	297.75
U431201	U431	201	trough	LR	20200	14000	41238.08
U431201	U431	201	floor	BR	320	880	197.51
U431201	U431	201	sill	BR	7090	11000	7559.2
U431201	U431	201	floor	KIT	246	510	58.49
U431202	U431	202	floor	LR	122	60	39.17
U431202	U431	202	sill	LR	89	260	1401.8
U431202	U431	202	trough	LR	40800	22000	37785.34
U431202	U431	202	floor	BR	528	26	<20
U431202	U431	202	sill	BR	369	490	5444.63
U431202	U431	202	floor	KIT	314	500	<20
U431207	U431	207	floor	LR	224	62	412.25
U431207	U431	207	sill	LR	1390	340	741.22
U431207	U431	207	trough	LR	100000	9300	6826.11
U431207	U431	207	floor	BR	72	72	119.87
U431207	U431	207	sill	BR	736	890	2168.34
U431207	U431	207	floor	KIT	211	32	72.59
U431208	U431	208	floor	LR	11400	640	143.07
U431208	U431	208	sill	LR	215	550	344.01
U431208	U431	208	trough	LR	2060	5600	4141.05
U431208	U431	208	floor	BR	993	600	124.25
U431208	U431	208	sill	BR	5710	1000	1389.61
U431208	U431	208	floor	KIT	396	320	245.7
U431209B	U431	209	floor	LR	43	22	154.3
U431209B	U431	209	sill	LR	<20	140	491.71

U431209B	U431	209	trough	LR	135000	89000	56336.44
U431209B	U431	209	floor	BR	119	97	221.74
U431209B	U431	209	sill	BR	231	270	13847.6
U431209B	U431	209	floor	KIT	30	48	110.16
U431301A	U431	301A	floor	LR	212	160	56.5
U431301A	U431	301A	sill	LR	173	190	109.9
U431301A	U431	301A	trough	LR	139000	59000	10613.01
U431301A	U431	301A	floor	BR	116	78	58.2
U431301A	U431	301A	sill	BR	242000	410	229.68
U431301A	U431	301A	floor	KIT	50	<20	<20
U431301B	U431	301	floor	LR	137	<20	306.9
U431301B	U431	301	sill	LR	652	770	2685.3
U431301B	U431	301	trough	LR	15200	8800	4433.7
U431301B	U431	301	floor	BR	59	26	39.35
U431301B	U431	301	sill	BR	668	NA	NA
U431301B	U431	301	floor	KIT	278	<20	25.25
U431313	U431	313	floor	LR	1850	73	<20
U431313	U431	313	sill	LR	517	880	1255.17
U431313	U431	313	trough	LR	21000	13000	4210.19
U431313	U431	313	floor	BR	54	48	<20
U431313	U431	313	sill	BR	1780	960	262.29
U431313	U431	313	floor	KIT	67	35	<20
U431315	U431	315	floor	LR	179	<20	
U431315	U431	315	sill	LR	240	94	
U431315	U431	315	trough	LR	8850	2400	
U431315	U431	315	floor	BR	82	52	
U431315	U431	315	sill	BR	207	220	
U431315	U431	315	floor	KIT	63	24	
U431408	U431	408	floor	LR	<20	<20	145.51
U431408	U431	408	sill	LR	211000	292.23	561.33
U431408	U431	408	trough	LR	33300	1750.81	34381.59
U431408	U431	408	floor	BR	<20	<20	290.99
U431408	U431	408	sill	BR	4020	283.01	753.86
U431408	U431	408	floor	KIT	<20	<20	103.62
U431413	U431	413	floor	LR	43	<20	<20
U431413	U431	413	sill	LR	310	807.7	485.8
U431413	U431	413	trough	LR	12800	807.76	5243.44
U431413	U431	413	floor	BR	35	849.67	<20
U431413	U431	413	sill	BR	848	1886.17	3341.76
U431413	U431	413	floor	KIT	<20	34.4	<20

U431502	U431	502	floor	LR	70	29	<20
U431502	U431	502	sill	LR	10600	5000	11005.17
U431502	U431	502	trough	LR	87900	110000	100,138.28
U431502	U431	502	floor	BR	648	58	<20
U431502	U431	502	sill	BR	240	11000	19,105.16
U431502	U431	502	floor	KIT	467	1500	<20
U431505	U431	505	floor	LR	<20	<20	<20
U431505	U431	505	sill	LR	170	520	280.96
U431505	U431	505	trough	LR	75000	12000	101061.45
U431505	U431	505	floor	BR	127	36	<20
U431505	U431	505	sill	BR	5490	2100	146.27
U431505	U431	505	floor	KIT	<20	20	<20
U431508A	U431	508A	floor	LR	86	37	82.05
U431508A	U431	508A	sill	LR	140	1300	417.71
U431508A	U431	508A	trough	LR	4930	11000	2145.89
U431508A	U431	508A	floor	BR	210	26	205.3
U431508A	U431	508A	sill	BR	470	560	247.68
U431508A	U431	508A	floor	KIT	34	<20	28.6
U431508B	U431	508	floor	LR	117	350	161.3
U431508B	U431	508	sill	LR	7300	12000	2133.69
U431508B	U431	508	trough	LR	125000	150000	18236.23
U431508B	U431	508	floor	BR	164	480	494.9
U431508B	U431	508	sill	BR	847	360	851.74
U431508B	U431	508	floor	KIT	168	280	679.25
U431512	U431	512	floor	LR	69	<20	<20
U431512	U431	512	sill	LR	524	2200	691.23
U431512	U431	512	trough	LR	12600	9200	19469.88
U431512	U431	512	floor	BR	84	<20	23.1
U431512	U431	512	sill	BR	835	2200	438.89
U431512	U431	512	floor	KIT	28	<20	23.8
U431601	U431	601	floor	LR	201	511.69	228.52
U431601	U431	601	sill	LR	939	520.55	847.22
U431601	U431	601	trough	LR	32700	6331.2	18800
U431601	U431	601	floor	BR	65	113.01	77.05
U431601	U431	601	sill	BR	466	167.64	491.81
U431601	U431	601	floor	KIT	79	98	353.27
U431607	U431	607	floor	LR	133	79.78	479.61
U431607	U431	607	sill	LR	7440	7579.51	319.48
U431607	U431	607	trough	LR	27100	5498.2	1296.94
U431607	U431	607	floor	BR	77	53.07	100.46
U431607	U431	607	sill	BR	2080	1852.36	1126.2

U431607	U431	607	floor	KIT	105	658.81	72.38
U431608	U431	608	floor	LR	168	415.03	279
U431608	U431	608	sill	LR	25900	25351.57	7153.1
U431608	U431	608	trough	LR	6080	8272.02	21079.52
U431608	U431	608	floor	BR	81	437.85	430.35
U431608	U431	608	sill	BR	1020	1991.12	4726.84
U431608	U431	608	floor	KIT	156	57.2	63.25
U609001	U609	1	floor	LR	<20	<20	<20
U609001	U609	1	sill	LR	<80	135.21	<20
U609001	U609	1	trough	LR	3080	4293.58	<20
U609001	U609	1	floor	BR	<20	<20	<20
U609001	U609	1	sill	BR	<120	<119.76	<20
U609001	U609	1	floor	KIT	21	<20	<20
U609002	U609	2	floor	LR	<20	<20	
U609002	U609	2	sill	LR	219	<54.80	
U609002	U609	2	trough	LR	2520	1822.65	
U609002	U609	2	floor	BR	<20	<20	
U609002	U609	2	sill	BR	142	<106.38	
U609002	U609	2	floor	KIT	<20	<20	
U609003	U609	3	floor	LR	<20	<20	
U609003	U609	3	sill	LR	937	1295.9	
U609003	U609	3	trough	LR	40700	7678.62	
U609003	U609	3	floor	BR	<20	<20	
U609003	U609	3	sill	BR	9140	188.61	
U609003	U609	3	floor	KIT	36	<20	
U609004	U609	4	floor	LR	<20	<20	
U609004	U609	4	sill	LR	949	<71.17	
U609004	U609	4	trough	LR	3720	464.22	
U609004	U609	4	floor	BR	<20	<20	
U609004	U609	4	sill	BR	173	<96.5	
U609004	U609	4	floor	KIT	<20	<20	

LIST OF JOURNAL ABBREVIATIONS

Am J Health Syst Pharm	American Journal of Health System Pharmacy
Am J Public Health	American Journal of Public Health
Arch Environ Health	Archives of Environmental Health
Altern Med Rev	Alternative Medical Review
British Med J	British Medical Journal
Env Res	Environmental Research
Environ Health Perspect	Environmental Health Perspective
N Engl J Med	New England Journal of Medicine
Postgrad Med J	Postgraduate Medical Journal

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