CITY OF COLUMBUS DIVISION OF WATER

PROJECT XL PROPOSAL

Proposal for Project XL
City of Columbus Division of Water

Date: June 11, 1999

Sponsored by: City of Columbus Ohio
Division of Water

Submitted in association with: The Columbus Childhood Lead Poisoning Prevention Program
The Columbus Health Department

Environmental Problem Addressed by the Project:

Childhood lead exposure from a variety of sources and through a variety of pathways in our community

Description of Project:

The Columbus Division of Water seeks regulatory flexibility in compliance with the Lead and Copper Rule promulgated under the Safe Drinking Water Act. Specifically, we propose to implement a comprehensive Lead-Safe Columbus Program designed to identify and reduce lead hazards as an alternative to the Lead and Copper Rule requirements for testing and replacement of lead service lines. This program is designed based on local lead risk assessment data and recognizes that children are exposed to lead from a variety of sources through a variety of pathways. The Program's interventions are targeted to children who are at most risk for lead poisoning and are targeted at those exposure pathways that would have the greatest impact on a child's body-lead burden.

Project's Anticipated Results:

The Lead-Safe Columbus Program is expected to provide greater public health protection from lead exposure in our community, at an equivalent or lower cost, than would be obtained by strict adherence to Lead and Copper Rule requirements by focusing on the predominant causative agent.

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SECTION 1
Introduction

The US Centers for Disease Control (CDC) has cited lead poisoning as "the most significant and preventable environmental health problem of children in the US." Evidence accumulated over the last fifteen years from epidemiologic, clinical and toxicologic studies indicates that blood lead levels as low as 10 micrograms per deciliter (ug/dL) are associated with neurobehavioral, cognitive and developmental effects. Among those effects are reduced IQ level; increased reading and learning disabilities; reduced attention span; increased hyperactivity and hearing loss; and, low birth weight, early delivery and developmental problems in the developing fetus. Lead poisoning has also been linked with cancer, anemia, high blood pressure, kidney disease, short-term memory loss, sterility, impotence and spontaneous abortion. *If lead poisoned children are not identified early in their exposure, and lead hazards are not eliminated from their environment, the amount of lead in their system can reach a level which results in convulsions, coma and, at the highest level, death.*

According to NHANES III (National Health and Nutrition Examination Survey III) nearly one million children under the age of six still have elevated blood lead levels (defined by the Centers for Disease Control as blood leads $\geq$ 10 ug/dL). In Columbus, **2,261** of 31,219 children screened between January 1, 1995 and December 31, 1997 had elevated blood leads (EBL's). The overall percentage of EBL's reported in the City of Columbus was 7.24%.

However, as indicated by the NHANES III data, the overall percentage of EBL's for the City does not reflect the relative risk for poor children living in deteriorated housing in older neighborhoods. Children living in poverty in the inner-city had elevated blood leads at a rate of 11.15%. Eighty-four percent (84%) of all EBL's identified within Columbus resided within these areas. All statistical data (especially the drastically higher rate of more than three times the incidence of EBL's among inner-city, minority children living under the poverty level) points to the impact of deteriorating lead-based paint in older housing as the predominant causative agent for childhood lead poisoning.

In order to comply with the Lead and Copper Rule, the City of Columbus is faced with the potential expenditure of between thirteen million and ninety-three million dollars over the next fifteen years to sample and replace lead service lines. These measures will have no measurable impact on childhood lead poisoning in Columbus. As an alternative, the Columbus Division of Water is submitting this XL project proposal to request regulatory flexibility for compliance with the Lead and Copper Rule (LCR). Specifically, we are requesting approval of our Lead-Safe Columbus Program (LSCP), which has a proven record of effectiveness in reducing the incidence of lead poisoning, as a substitute for Lead and Copper Rule requirements for testing and replacement of lead service lines.

SECTION 2
The Lead and Copper Rule

2.1 History and Requirements

In 1991, the EPA promulgated the LCR under the Safe Drinking Water Act Amendments of 1986 to reduce lead and copper in water at customer taps (Federal Register, 1991). The LCR establishes a process that includes a regulatory schedule and requirements for sampling, treatment for corrosion control, public education, and service line replacement.

The LCR requires large water systems such as Columbus's to determine the optimal type of corrosion control treatment for their system and provide this treatment by January 1997. The LCR defines optimal treatment as that which minimizes lead and copper levels in drinking water without causing violations of other drinking water standards. The LCR also requires implementation of a specified public education program as long as lead action levels are exceeded.

Public water systems that continue to exceed the lead action levels even after installing optimal corrosion control treatment and source water treatment must replace lead service lines that contribute in excess of 15 parts per billion (ppb) to total tap water lead levels. The system must replace seven percent of its lead lines each year, or it must demonstrate that the lines that were not replaced contribute less than 15 ppb of lead to drinking water at the tap (*thereby, requiring that at least 7% of the lines must be tested each year)*. A public water system has 15 years to replace all lead lines under its jurisdiction. It must replace the entire line, unless it can demonstrate that it does not control the entire lead line, and it must offer to replace the owner's portions of the service line at the owner's expense. In the case of Columbus, this would require us to sample 2,500 sites each year. We estimate that sampling and replacement would cost *a minimum of eight hundred fifty thousand dollars* ($850,000) annually for a total of twelve and three-quarter million dollars ($12,750,000) over the fifteen years required to complete replacement. (The *worst case scenario* estimates of the potential maximum cost range up to an average of $6,680,000 per year for a total of $93,537,000.)

2.2 Columbus's LCR Compliance Activities

Columbus has an excellent record of compliance with drinking water regulations and has complied with all LCR requirements to date, and has optimal corrosion control and source water treatment in place. In 1992, initial monitoring was conducted, including monitoring of lead and copper at customers' taps. Lead action levels, **based on "worst-case, first draw"** samples, were exceeded in Columbus. Columbus has been implementing the LCR-specified public education/notification program since 1992.

In 1997, Columbus again exceeded the action level, thus bringing into effect the requirement that "public water systems that continue to exceed the lead action levels even after installing optimal corrosion control treatment and source water treatment must replace lead service lines that contribute in excess of 15 parts per billion (ppb) to total tap water lead levels." This failure was due in large part to operational issues that inadvertently increased lead solubility. The Division of Water began utilizing ferric chloride for coagulation purposes to enhance the removal of disinfection byproduct precursors (i.e., the Disinfection Byproduct Rule), where alum has been used in the past. The increased chloride contributed to increased lead solubility. In 1997, the water treatment coagulant was changed from ferric chloride to alum. This resulted in a chloride to sulfate ratio below 0.58, and reduced lead solubility. As a result, the lead action level was not exceeded in the three monitoring periods conducted since June 1997.

There is no detectable lead in Columbus's source water. Lead enters drinking water primarily as a result of corrosion of building plumbing materials. The most common sources of lead include lead-soldered joints in copper pipe and faucets and other fixtures made from lead-bearing brass. Two key points should be noted: (1) that there are no lead main waterlines within the Columbus distribution system, and (2) that in all cases where "first draw" samples which reflect the contribution of lead *from lead solder and plumbing fixtures* exceeded the action level, samples collected from service lines were below the action level.

SECTION 3
Lead Exposure in the Columbus Area

3.1 Interpretation of Blood Lead Levels:

The Centers for Disease Control and Prevention offers the following guidelines for interpretation of blood lead levels (CDC, 1991):

Blood lead level (ug/dL)	Interpretation and guidance for health care providers
10 - 14	Currently identified as lowest level of concern: provide education to decrease exposure with simple interventions. (Utilized as a measure of the need for *community-wide* intervention.)
15 - 19	Children should receive nutritional and educational interventions and more frequent screening. If the blood lead level persists in this range, environmental investigation and intervention should be done.
19 - 44	Children require full medical evaluation, environmental evaluation and remediation. May need pharmacological treatment.
45 - 69	Children require full medical evaluation and treatment (including chelation), environmental evaluation and remediation.
$\geq$ 70	Medical emergency - medical and environmental management must begin immediately.

3.2 Lead Paint in Housing:

Lead was banned from inclusion in residential paint and gasoline in 1978. CDC, the EPA, and HUD all view deteriorating lead-based paint as the predominant cause of childhood lead poisoning in the United Sates. According to NHANES III (National Health and Nutrition Examination Survey III) nearly one million children under the age of six still have blood lead levels $\geq$ 10 ug/dL. **All statistical data (especially the drastically higher rate of more than three times the incidence of EBL's among inner-city, minority children living under the poverty level) points to the impact of deteriorating lead-based paint in older housing as the predominant causative agent for childhood lead poisoning.**

The following statistics, taken from the 1990 Census, illustrate the nature of the housing stock in Columbus:

Housing units constructed prior to 1978 (the year in which lead was banned from residential paint) - 102,313 (87%).
Housing units built before 1960 - 91,313.
Housing units constructed before 1950 (which is viewed as the year in which paint manufacturers began to voluntarily reduce the amount of lead in paint) - 46,667.
Of the 116,832 housing units in the central city, the Columbus Department of Trade and Development estimates that 14,503 (12%) are substandard units, i.e., not meeting City housing code standards.

3.3 Occurrence of Childhood Lead Poisoning in Columbus:

Since 1991, the Columbus Health Department has had a Childhood Lead Poisoning Prevention Program (CLPPP) in place which provides medical case management, education and environmental assessment functions for children with elevated blood lead levels. Since 1995, the CLPPP has collected data on all blood leads drawn within the city. The overall percentage of EBL's reported in the City of Columbus was 7.24%. Out of 31,219 children screened from 1995 through 1997, 2,261 had elevated blood leads.

However, as indicated by the NHANES III data, the overall percentage of EBL's for the City does not reflect the relative risk for poor children living in deteriorated housing in older neighborhoods. High risk census tracts and zip codes have been identified utilizing factors for age of housing, children in poverty, and incidence of elevated blood leads in children less than six years old (see maps and charts in Attachment A).

1. Twenty-five (25) census tracts within ten (10) zip codes in Columbus reported elevated blood leads (EBL's) at a rate of 6.12% or higher during the period 1995 through 1997. The rates ranged up to 19.4%, with an average of 11.15%. (1,899 of the 2,261 (84%) children identified within Columbus with elevated blood leads resided within these areas.)
2. An average of 67% of the housing within the identified areas was built before 1950, with a range of 21% for the low and 89% for the high within the census tracts.
3. The population of the identified areas is composed of 63.5% minorities with a high of 95%.
4. Of the 10,578 children under the age of six who reside in the identified census tracts, 6,118 (58%) are living at or below poverty level. The highest percentage

for any census tract was 85%.

5. The existing program has had a positive impact on childhood lead poisoning in Columbus. Out of 603 children with blood lead levels of 15 ug/dL or greater who received interventions from the program between 1995 and 1997 for whom follow up blood leads are available, 587 (**97.5%) had their blood leads reduced by at least five ug/dL.** (One hundred ninety (190) or 31.5% had blood leads reduced by *15 ug/dL or more*.) In addition, the overall rate of EBL's was reduced by 19% (from 7.9% to 6.42%) between 1995 and 1997.

Of the 655 residential units which received lead hazard risk assessments since 1995, lead paint hazards were identified in 566 (86.4%). The program has never identified lead in water as the source of contamination for a lead-poisoned child. In addition, the CLPPP tested children from five families whose tap water exceeded the LCR standard in 1997. None of those children had a blood lead of greater than nine ug/dL.

XL projects must be consistent with Executive Order 12898 on Environmental Justice. The intent of this order is to prevent minority and low-income communities from being subject to disproportionately high and adverse environmental effects. Under the requirements of the LCR, half of the homes which the Division of Water surveys annually must have been constructed between 1983 and 1987. It is not surprising that, in Columbus, all of these homes sampled are located in middle to upper-middle class neighborhoods. Given the data above, ***strict compliance with the LCR would result in a shifting of resources away from those populations which are at the highest risk from lead hazards.*** (All homes exceeding the action level were located in upper-middle class neighborhoods, rather than in poorer inner-city neighborhoods where the incidence of lead poisoning is highest.) Our proposal not only complies with the Executive Order, but seeks to correct the inequitable distribution of environmental risk which exists under strict adherence to the LCR.

SECTION 4
Project XL and the Lead-Safe Columbus Program

4.1 Lead and Copper Rule Requirements:

Columbus is proposing to implement a Lead-Safe Columbus Program as an alternative to the Lead and Copper Rule requirements for testing and replacement of lead service lines. The goal of the LSCP is to achieve better public health protection from lead exposure, at an equivalent or lower cost, than would have been achieved with strict adherence to the testing and replacement of lead service lines requirements of the Lead and Copper Rule.

The LCR defines optimal treatment as that which minimizes lead and copper levels in drinking water without causing violations of other drinking water standards. The EPA in 1995 emphasized that interventions to reduce lead exposure should be targeted at those exposure pathways that have the greatest impact on the health of the child by reducing his or her body-lead burden. In this case, the proposed intervention, i.e., replacement of lead service lines, can be demonstrated to have little if any positive impact on the lead in water available at the tap. (In fact, at least two studies have found that it is probable that disturbance of older lines will actually *increase* the level of lead in water at the tap by mobilizing otherwise stable concentrations.)

A comparison of all "first draw" versus samples collected from service lines indicates that only first draw samples, i.e., samples composed of water which has been sitting in plumbing within the residence itself, exceeded LCR standards. Samples collected from lead service lines have not exceeded the standard. This fact serves as evidence that lead in drinking water within the distribution system of the City of Columbus Division of Water is a direct result of corrosion of plumbing materials within buildings. (The most common sources of these metals include lead-soldered joints in copper pipe and faucets and other fixtures made from lead-bearing brass.)

Under our proposal, the City would alter water treatment methods to achieve removal of disinfection by-product precursors similar to that provided by ferric chloride while remaining in compliance with the LCR, continue to monitor lead in water samples, and replace lead service lines as they are identified through normal operations. However, we would not initiate the essentially ineffective (and probably counterproductive), and extremely costly sampling and/or replacement of 7% of lead service lines per year, with a *minimum* estimated costs of $850,000 per year. The savings in capital and operating costs would be used to provide approximately $300,000 annually in funding for the Lead-Safe Columbus Program, which would continue and enhance educational efforts, identify residential lead hazards, and provide funding for lead hazard abatement within low-income housing. The end result would be a net

savings in costs to the community while providing targeted interventions to produce real, positive health impacts on the greatest number of at-risk individuals.

4.2 Design Objectives

The Lead-Safe Columbus Program is committed to achieving the following objectives;

- Reduce the level of childhood lead poisoning within the City of Columbus;
- Prevent lead poisoning before it occurs (primary prevention);
- Provide realistic and effective remedies;
- Focus on those most at-risk to significant lead exposure and on those lead sources and exposure pathways that would be expected to have the greatest impact on a child's lead burden;
- Implement feasible and cost-effective methods for reducing lead hazards which are appropriate for both the immediate needs of the child and the long-term needs of the community;
- Develop, encourage and support community participation in lead hazard reduction and education efforts;
- Evaluate program efforts for their effectiveness in achieving objectives, and modify when necessary to enhance effectiveness.

4.3 Components of the Lead-Safe Columbus Program:

The current Childhood Lead Poisoning Prevention Program utilizes a $100,000 grant from the Centers for Disease Control (CDC) to partially fund medical case management and lead hazard identification for severely lead-poisoned children. In addition, the Department of Trade and Development has committed $400,000 each of the last two years to the abatement of residential lead hazards utilizing CDBG and HOME funds.

Under this proposal, the Division of Water will provide an additional $330,000 in 1999, and equivalent amounts for the next fourteen years. This will be combined with the existing resources and $100,000 in general fund monies to create a comprehensive program with an emphasis on prevention as well as continuing to address the needs of lead-poisoned children. The components of that program are as follows:

4.3.1 Responsibilities of the Division of Water:

1. The Division will undertake the following **education initiatives**:
    1) Informational brochures related to the risks and prevention of lead poisoning will be

inserted into each customer's bill when appropriate.
2) A cover letter with lead "bullets" and brochures will be mailed to health care providers, all private day-care/elementary schools, and all school district offices in Franklin County.
3) News releases and public service announcements will be sent to all local media in the Columbus service area when appropriate.
4) A "Lead Education" public service video, produced by the City of Columbus Government Access Channel in cooperation with the Division of Water, will be aired on GT3. Copies of the video also will be distributed to local television stations.
5) The Division of Water has developed an in-house "Speakers Bureau," consisting of knowledgeable staff which visits schools, community organizations, public events, etc. and presents information pertaining to drinking water, including the issue of lead.

2. The Division will alter its **water treatment processes** in the following manner:
1) The water treatment coagulant has been changed from ferric chloride to alum. This has resulted in a chloride to sulfate ratio below 0.58, which reduced lead solubility.
2) The zinc-orthophosphate corrosion inhibitor has been changed. The corrosion inhibitor used historically has a phosphate to zinc ratio of 3:1 and is chloride based. The corrosion inhibitor being put in place has a phosphate to zinc ratio of 5:1 and is sulfate-based. This allows elevation of the phosphate concentration in the finished water for lead solubility reduction, without increasing the level of zinc.
3) The Division has completed the **documentation of service line material** contained in the distribution system tap-card reference files. The information has been computerized to include length of service line, address, customer name and phone number. (Please note that information contained in the tap-card reference files notes the material of construction from the distribution system main to the curb stop. The material of construction from the curb stop to the meter, i.e., the customer's service line, is not noted.)
4) The Division will conduct **lead service line distribution system studies** designed to test the hypothesis that the lead service lines do <u>not</u> contribute to lead at the tap.
a) The Division will collect samples from 2500 residences served by a lead service line (7% of the estimated total number of lead service lines in the distribution system). The concentration of lead in samples collected after the water has remained standing in the line for at least six hours will be determined. Follow-up studies will be done at any sites where the lead concentration exceeds the lead action level.
b) Two sets of five homes will be chosen where the entire service line, i.e., the line from the distribution system main to the home owner's meter, is lead. Worst-case samples (first water) will be taken for five consecutive days to

establish lead concentrations. In one set of five houses, the entire service line will be replaced. In the other, the customer's service line will remain, and the line will be replaced from the distribution system to the curb stop. Sampling will then be repeated to determine the impact.

3. **The Division is <u>not</u> seeking *carte blanche* relief from LCR requirements. If at any time, the standards are exceeded, we are requesting a "window" of no more than three years to achieve compliance.**

4. The Division will provide funding to operate the Lead-Safe Columbus Program under the Columbus Health Department.

<u>4.3.2 Responsibilities of the Lead-Safe Columbus Program operating under Columbus Health Department:</u>

1. **Medical case management** will be provided for all children with blood leads $\geq$ 15 ug/dL. Educational brochures will be sent to all children with blood leads from 10 to 14 ug/dL. The LSCP will also provide free blood lead screening at its monthly clinic, probe screens within the community, and *test all children less than six residing in a home where tap water exceeded the Lead action level.*

2. **Lead hazard risk assessments** will be conducted in the following cases:
   1) For all children with blood leads $\geq$ 15 ug/dL;
   2) For all privately-owned, low-income residences built before 1978 which apply for funding for rehab activities from the Department of Trade and Development;
   3) Privately-owned, low income residences will be recruited from within high-risk areas to receive assessments and financial assistance in performing lead-hazard abatement. High risk census tracts and zip codes have been identified utilizing factors for age of housing, children in poverty, and incidence of elevated blood leads in children less than six years old. The areas can be described as follows:
      1. They are composed of twenty-five (25) census tracts within ten (10) zip codes.
      2. EBL's were reported at a rate of 6.12% or higher during the period 1995 through 1997. The rates ranged up to 19.4%, with an average of 11.15%.
      3. 1,899 of the 2,261 (84%) children identified within Columbus with elevated blood leads resided within these areas.
      4. 67% of the housing within the identified areas was built before 1950, with a range of 21% for the low and 89% for the high.
      5. The population of the identified areas is composed of 63.5% minorities with

a high of 95%.

6. Of the 10,578 children under the age of six who reside in the identified census tracts, 6,118 (58%) are living at or below poverty level. The highest rate for any zip code was 85%.

3. **Public education/outreach** activities will be directed toward identified high-risk areas and include the following components:

1) ***Peer-based Parent Education*** will be directed toward low-income parents and home day care providers; and designed to educate them as to methods by which they can prevent their children and themselves from becoming lead poisoned. The primary teaching method will entail a ninety minute workshop conducted in partnership with neighborhood-based organizations by neighborhood residents trained by Lead-Safe Columbus. Content will cover no cost/low-cost methods of prevention including specialized cleaning methods, nutrition, and blood screening. Each participating household will receive a "specialized cleaning" kit (including bucket, sponges and detergent) after completing the workshop.

2) ***Education for Parents of Lead-Poisoned Children*** will be designed to educate parents of already lead-poisoned children (i.e., those with reported blood leads of $\geq$ 15 ug/dL). The purpose will be to train them in how they can reduce the hazard from lead dust and maintain a lead-safe environment within their home to prevent their children and themselves from becoming recontaminated.

Two primary methods of education will be utilized. The first will be a home-based education and specialized cleaning kit provided by home health nurses and risk assessors directly to the families during the risk assessment or home visit. The second will also occur in the home, but will involve training in specialized cleaning utilizing City Year volunteers who will conduct a specialized cleaning of the entire home as a means of training the parent/occupant in proper maintenance to reduce lead dust hazards in the home. (City Year is a program partially sponsored by Americorps as part of the "domestic urban peace corps," which provides ten months of community service for 17-24 year-olds from diverse backgrounds seeking to meet the critical needs of the community.)

3) Training will be provided to local remodelers, renovators, painters, do-it yourselfers (DIYers) and property maintenance staff. The program will be designed to equip workers with the skills and knowledge that enable them to implement lead-safe work practices during remodeling, renovating, painting and maintenance activities. We will conduct workshops in partnership with Central Ohio National Association of the Remodeling Industry (NARI), the Columbus Apartment Association, Painting and Decorating Contractors Association (PDCA), and trade unions. Some workshops will be modeled after the HUD/NARI Lead Remodeler's Training developed by NARI and

Applied Systems Inc. Others have been developed by Lead-Safe Columbus to train property maintenance staff in specialized cleaning and essential maintenance practices. Additional topics will include best practices, cost estimating, etc. Tuition will be partially subsidized by Lead-Safe Columbus.

We will also be offering a **Lead-Safe DIYers Training**, designed to enable families with lead poisoned children to reduce the level of lead in their children through *immediate* changes in their lifestyle and environment **or** train DIY'ers (with children less than six years of age) participating in Community Reinvestment Area (CRA) paint-up programs.

4) ***Property owners, realtors, 1st time home buyers, financial institutions, neighborhood groups, and nonprofit housing organizations*** will be provided with education designed to expand the awareness and practice of the EPA Disclosure Law, Ohio lead laws and the Fair Housing laws. This training will be designed and implemented in a partnership with Columbus Apartment Association, HELP (Help End Lead Poisoning) a newly formed statewide lead education group, and the Columbus Urban League.

5) A training module targeted at ***Management, Monitoring and Maintenance Training for Property Owners and Their Maintenance Crews*** will be designed to enable property owners to effectively manage, monitor and maintain lead-safe housing. The result will be that lead-based paint will remain controlled and in a nonhazardous condition. The primary focus will be on one-on-one consultation with property owners receiving funds through the Department of Trade and Development. This will entail a review of and commitment to our Management, Monitoring and Maintenance Plan. We will also make the plan available to other property owners who are not using city funds.

6) ***General Information and Overview of Lead Poisoning Prevention*** targeted to the general public, hardware/paint stores, physicians, nurses, schools, day care centers, media etc. will be designed to raise community awareness of the problems and solutions of lead poisoning our children. Strategy to enhance current initiatives will be determined in consultation with community groups, CDC, the Ohio Department of Health and program staff.

4. ***Lead Hazard Abatement Grants*** will be issued under two different protocols.

1) Grants will be issued to up to twenty (20) private owners of housing for low- to moderate-income families per year. These grants will be limited to no more than ten thousand dollars ($10,000), with an anticipated average of no more than five thousand dollars ($5,000). They will be targeted to housing which does <u>not</u> require major structural repair, but does have lead hazards which can be eliminated through relatively minor measures, such as paint stabilization or encapsulation.

2) Larger projects will be funded through low-interest loans from the Department of

Trade and Development utilizing the CDBG or HOME funded programs. (Trade and Development has committed to the identification and correction of lead hazards as a precondition to the issuance of any loans utilizing those funds.)

SECTION 5
Evaluation Criteria for Project XL Proposals

There are eight criteria for XL Project selection presented in this proposal:

1. Superior Environmental Results
2. Monitoring, Reporting and Evaluation
3. Stakeholder Involvement and Support
4. Innovation/Multimedia Pollution Prevention
5. Shifting of Risk Burden/Equitable Distribution of Environmental Risks
6. Transferability
7. Feasibility
8. Cost Savings and Economic Opportunity

5.1 Superior Environmental Results

Demonstration of superior environmental performance involves comparison of benefits achieved by activities required by the LCR and those proposed in the Program. Since the Columbus CLPPP has provided medical case management, lead hazard risk assessments, and educational services since 1991, significant data exists to indicate that superior results will be achieved through our proposal. Under our proposal, every child with a blood lead level of 15 ug/dL or higher would receive educational, medical and environmental intervention. Whenever lead hazard reduction activities occur, clearance tests would confirm the reduction in lead dust levels. Follow up blood lead tests would verify reduction in the child's blood lead level. Therefore, both primary and secondary effects would be measured for effectiveness.

A comparison of all "first draw" versus samples collected from service lines indicates that only first draw samples, i.e., samples composed of water which has been sitting in plumbing within the residence itself, exceeded lead action levels. Samples collected from lead service lines have not exceeded the standard. This fact serves as evidence that lead in drinking water within the distribution system of the City of Columbus Division of Water is a direct result of corrosion of building plumbing materials. (The most common sources of these metals include lead-soldered joints in copper pipe and faucets and other fixtures made from lead-bearing brass.) Therefore, any action to remove existing lead service lines would have little or no impact on the total lead in drinking water (in fact, may actually increase the lead in water at the tap), and even less impact on the lead burden of a child residing in the home served by those lines.

5.1.1 Evaluation of Benefits

Any discussion of "superior environmental results" is necessarily related to the "evaluation" of those results. Interventions can range from lead hazard abatement (which include removal or encapsulation of a source of lead exposure) to education/behavior modification efforts. Interventions can be assessed for their effectiveness in lowering a child's body-lead burden or the levels of lead in his or her environment.

It is often not feasible to directly assess health benefits following intervention, as some outcomes may not manifest themselves for a long time, and can be subtle, complicated, and costly to measure directly. Blood lead concentrations can serve as a good surrogate health endpoint in some instances due to the established association between blood lead levels and adverse health effects. For example, in studies where interventions sought "secondary" rather than "primary" prevention (i.e., assessing the effectiveness of interventions on already poisoned rather than unexposed children), blood lead concentrations of exposed children have been used as the primary measure of intervention efficacy.

In addition to the measurement of blood lead levels, levels in environmental media, such as dust lead levels, can provide valuable information. Such measures cannot demonstrate an intervention's impact on affected children in terms of actual exposure or health effects, but they can be used to evaluate its effectiveness in reducing or eliminating a targeted lead hazard.

Currently, there is insufficient information available to identify a particular intervention strategy as markedly more effective than others when dealing with children with blood leads in the 15-19 ug/dL range. Comparable reductions in blood lead levels are observed resulting from the abatement of lead-based paint and contaminated dust and soil, or in-home educational efforts. It is unclear whether more costly, large scale abatement strategies are more successful than less-expensive in-place management practices.

5.1.2 ESAC Report on Lead/Copper Issue

At the request of the Division and the Health Department, the Environmental Science Advisory Committee (ESAC) considered the issue of the LCR as it has been applied to Columbus. ESAC consists of eighteen members of the scientific community appointed by the mayor with the mission of providing independent, technical advice on the scientific rationale, relevancy and benefits of current or proposed federal and/or State of Ohio environmental legislation or regulations, or other environmental matters affecting City of Columbus policy. The *Final ESAC Report on Lead/Copper Issue* is enclosed in Attachment C of this proposal.

The report reaches the following conclusions:

1) It is extremely unlikely that having a lead service line is associated with having a water

sample which exceeds the LCR lead standard. Homes without lead service lines, which have been sampled in the past, were ten times as likely to have elevated lead in the water than were Columbus homes with lead service lines.

2) Data collected using the EPA mandated methodology is highly unreliable with highly variable results. Having a one-time exceedance does not necessarily indicate that the "real" 90th percentile concentration of lead in the samples exceeded the allowable amount in the entire population.

3) The impact of flushing for 30 seconds to two minutes reduced the lead concentration in the water to well below the "action level" in all cases, indicating that the lead source is the plumbing and solder inside the house, not the lead service lines.

4) The EPA establishes the rebuttable presumption that lead service lines and connections contribute to lead levels at the tap. To rebut the presumption, and avoid replacing the lines, the Division would be required to monitor each home with a lead service line to determine its contribution to lead levels at the tap. Since the EPA considers the presumption rebutted only when each line the system wished to avoid replacing has been monitored, this procedure becomes extremely expensive.

We believe that implementing the Lead-Safe Columbus Program will provide superior environmental performance by providing better public health benefits than would be achieved by strict adherence to the Lead and Copper Rule requirements for testing and replacement of lead service lines. The superior performance would result from the Program's design which is based on evaluation of existing local lead risk assessment data.

5.2 Monitoring, Reporting and Evaluation:

The primary objective of this program is to ameliorate the impact of an environmental hazard, i.e., lead, on the health and well-being of that portion of the community most at risk from its effects. Therefore, we will monitor, report and evaluate both the reduction of lead in the environment and the reduction in the incidence of childhood lead poisoning both within the community at large and within those neighborhoods which have been most at-risk.

Since all blood leads of children less than six years old are reported to the CLPPP, the impact of both the program's general public education and targeted education efforts should be reflected in the incidence rate for elevated blood leads in the community as a whole and within target neighborhoods. In addition, we will provide and track follow-up blood leads for all EBL's. The effectiveness of medical case management, education and abatement efforts will be measured by an expected drop in blood leads for those children receiving services. (Out of 603 children with blood lead levels of 15 ug/dL or greater who received interventions from the

program between 1995 and 1997 for whom follow up blood leads are available, 587 (**97.5%**) **had their blood leads reduced by at least five ug/dL.** (One hundred ninety (190) or 31.5% had blood leads reduced by *15 ug/dL or more.*)

All data regarding lead hazard risk assessments will be stored within a data base. Whenever abatement activity occurs, dust and soil samples will be collected to verify that safe levels have been attained. The program will also conduct six-month follow-up sampling to determine whether lead-safe levels are maintained. This will provide us with a valid measure of both the abatement methods used and the effectiveness of education from the standpoint of maintenance.

When formal education classes are provided for property owners, maintenance crews, painters or parents, pre- and post-testing will be conducted to determine the effectiveness of the education module. In addition, free initial blood lead screening will be offered to the children of participants, as well as follow up blood lead tests. The expected results will be that those children that do not have an elevated blood lead level at the time of the training will be prevented from having one later, and that those that do will have lower lead levels at the time of follow-up.

Steps taken by the Division of Water will be measured through analysis of the tap water. The Division has changed the water treatment coagulant from ferric chloride to alum. This resulted in a chloride to sulfate ratio below 0.58, which reduced lead solubility. In addition, the zinc-orthophosphate corrosion inhibitor has been changed, which allows elevation of the phosphate concentration in the finished water for lead solubility reduction, without increasing the level of zinc.

The Division has completed the **documentation of service line material** contained in the distribution system tap-card reference files. The information has been computerized to include length of service line, address, customer name and phone number.

The Division will conduct **lead service line distribution system studies** designed to test the hypothesis that the lead service lines do <u>not</u> contribute to lead at the tap. In the first, the Division will collect samples from twenty-five hundred residences served by a lead service line (7% of the estimated total number of lead service lines in the distribution system). The concentration of lead in samples collected after the water has remained standing in the line for at least six hours will be determined. Follow-up will be done at any sites where the lead concentration exceeds the lead action level. For the second, two sets of five homes will be chosen where the entire service line, i.e., the line from the distribution system main to the home owner's meter, is lead. Worst-case samples (first water) will be taken for five consecutive days to establish lead concentrations. In one set of five houses, the entire service

line will be replaced. In the other, the customer's service line will remain, and the line will be replaced from the distribution system to the curb stop. Sampling will then be repeated to determine the impact.

Reports on all activities will be generated on a quarterly basis utilizing existing data bases (such as STELLAR, the CDC-designed data base for childhood lead poisoning data) and evaluated annually as to their effectiveness.

5.3 Stakeholder Involvement and Support:

The existing CLPPP has established relationships with a variety of stakeholders who are in support of the proposal. They will be directly involved in specifics of the program's design and implementation, and, in many cases, already serve on the Advisory Committee. Those stakeholders include the following:

1. Community groups: Hilltop Civic Council, St. Stephens Community House, Neighborhood House, Central Community House
2. Parent Support Organizations: Help End Lead Poisoning (HELP) and Association of Parents to Prevent Lead Exposure (APPLE)
3. Institutional and Other Agency Support: Ohio Section of the American Water Works Association, Children's Hospital, Battelle Memorial Institute, Columbus Apartment Association, Columbus Housing Partnership, Columbus Metropolitan Housing Authority, Ohio Childhood Lead Poisoning Prevention Program (under the Ohio Department of Health), the Alliance to End Childhood Lead Poisoning, the National Association for Lead Safe Housing, and the Columbus Department of Trade and Development.

5.4 Innovation/Multimedia Pollution Prevention:

While the Columbus Childhood Lead Poisoning Prevention Program (and similar programs nationwide) has provided some of the services described for several years, our proposal constitutes an innovative approach to the issue of childhood lead poisoning in its scope, and breadth of services. The following aspects of the proposal are key factors in the innovation and effectiveness of the proposal:

1. All aspects of the childhood lead poisoning issue are addressed. In addition to traditional screening and risk assessment functions, our proposal will provide an ambitious and comprehensive education effort which encourages individual responsibility, long-term maintenance and prevention as well as corrective measures; target those populations most at-risk from lead hazards; provide limited targeted

funding for abatement; have a "proactive" orientation in seeking to identify and eliminate potential hazards before lead poisoning occurs, while still providing treatment for lead-poisoned children; develops and encourages community involvement; and continues to address the issue of lead in water with a rational, measured and responsible level of response.

2. The comprehensive nature of the education program will provide direct training to those most at-risk, and those which can have the greatest impact on eliminating lead hazards within a child's environment. Training will be provided to parents of children less than six, who live in older, deteriorated housing by program staff, City Year volunteers, and local community groups with an emphasis on low-cost, no-cost measures which prevent the accumulation of lead dust within the home, encourage behavioral change, and provide nutritional counseling, thereby ameliorating the impact of lead on the child. The education modules, *and the choice of educators*, whether they are neighborhood-based community groups, professionals within the program or City Year volunteers are logical and appropriate alternatives chosen on the basis of both the clarity and effectiveness of the message and the credibility of the messenger.

   Property owners, maintenance workers, painters, "do-it-yourselfers" and others directly involved in home remodeling will receive training in how to perform their tasks in such a way as to prevent the creation of lead hazards as a result of their work. Property owners and maintenance workers will also be trained in proper maintenance practices so that long-term deterioration is lessened as a factor in lead-poisoning.

   Professional outreach will also continue and expand. Medical providers will continue to receive mailings and presentations from program staff so that their knowledge and awareness of the issue does not wane. Daycare providers and other care givers will be educated in the hazards and effects of lead poisoning so that they may eliminate those hazards from their environment and assist in the identification of lead-poisoned children.

   Both the Division of Water and the Health Department will conduct an aggressive public information campaign aimed at educating the general population as to the existence of lead hazards and their effects on children, as well as, means of prevention. While lead in drinking water will be included in the public outreach effort, major emphasis will be placed on the risks from lead paint in the homes.

3. A "proactive" approach designed to prevent lead hazards before children are poisoned will be reflected in our recruitment of properties with the potential for relatively low-cost remediation. As a first step in this approach, we have already reached a cooperative agreement with the Columbus Metropolitan Housing Agency to recruit property owners approved for Section 8 certificate holders. The basic tenet behind this approach is that these rental properties have already been certified as "decent, safe and sanitary," therefore they should not require extensive and costly structural repair to

eliminate or prevent lead hazards. We will offer to perform a free lead assessment and provide an average of $5,000 in grants for lead-hazard abatement. (If the project requires greater funding, we will coordinate with the Department of Trade and Development to identify additional funding from CDBG, HOME or other sources.) Our proposal will entail extensive efforts to recruit similar properties within high-risk areas. By limiting the amount of the grants, we will be able to provide the greatest number of abatements while emphasizing preventive maintenance.

4. The nature of the relationship between the Division of Water and the Columbus Health Department inherent in this proposal is unique. For the first time, Public Utility resources will be designated to address aspects of an environmental or health issue outside of their own functions.
It should be noted that the Health Department has a relatively small CDC grant, and a larger HUD grant which will be expended in early 1999. Cities such as Columbus which seek to address important but extremely costly issues such as lead poisoning are struggling to identify resources with which to do so. This relationship provides an invaluable opportunity to maximize available resources on the local level ~~to apply~~ a logical and appropriate response to a serious environmental and health issue.

5.5 Shifting of Risk Burden/Equitable Distribution of Environmental Risks:
XL projects must be consistent with Executive Order 12898 on Environmental Justice. The intent of this order is to prevent minority and low-income communities from being subject to disproportionately high and adverse environmental effects. Our proposal not only complies with the Executive Order, but seeks to correct the inequitable distribution of environmental risk which exists under strict adherence to the LCR.

According to NHANES III (National Health and Nutrition Examination Survey III) nearly one million children under the age of six still have blood lead levels $\geq$ 10 ug/dL. The impact of older deteriorated housing, poverty and race is reflected in an incidence rate three times higher among inner-city, minority children living under the poverty level than in the general population of children.

Under the requirements of the LCR, half of the homes which the Division of Water surveys annually must have been constructed between 1983 and 1988. It is not surprising that in Columbus, all of these homes sampled are located in middle to upper-middle class neighborhoods. An even more telling fact is that all but one of the homes which exceeded the action level were in these areas and all were occupied by middle to upper-middle class families. (This can best be explained by the impact of lead soldered joints in copper pipe and

faucets and other fixtures made from lead-bearing brass.) Therefore, compliance with the LCR actually directs energy and resources away from older deteriorating inner-city neighborhoods where the high-risk population resides.

Implementation of our proposal will correct the existing situation in which there is an inequitable distribution of environmental risk inherent under strict adherence to the LCR by redirecting resources to the deteriorating areas within the inner-city which are most at-risk.

5.6 Transferability:

Education modules have already been developed for many of the training classes proposed, and will be made available to any program seeking to duplicate our efforts. Activities will be well documented and serve as a model for similar programs. It is our belief that this program could be duplicated by any local government entity which possesses the conviction and commitment to attack childhood lead poisoning in a comprehensive manner.

5.7 Feasibility:

The Columbus Division of Water is fully competent and capable of reaching all of its commitments under the proposal.

The Columbus Health Department has a proven track record in delivering services to lead-poisoned children, and a history of inter-agency cooperation on this issue. Early in 1997, the program was invited to attend the national lead conference in Washington, D.C., conducted by HUD and the National Center for Lead Safe Housing, where we presented on the topic of "Interagency Cooperation and Successful Lead Abatement Programs." We are considered to be a national model for such cooperative efforts, and were recognized as such by receiving a *Best Practices Award* from HUD in 1998 for our educational program.

Necessary alliances with governmental agencies, community groups, parent support organizations and professional and business groups are in place. The staff has all the necessary expertise and is experienced in providing similar services.

5.8 Cost Savings and Economic Opportunity:

The Division of Water estimates that it will cost a *minimum of eight hundred fifty thousand dollars* ($850,000) annually for a total of twelve and three-quarter million dollars ($12,750,000) over the fifteen years required to comply with the provisions of the LCR for

sampling and replacement of lead service lines. (The *worst case scenario* estimates of the potential maximum cost range up to an average of $6,680,000 per year for a total of $93,537,000.). The savings in capital and operating costs would be used to provide at least $300,000 annually to the Lead-Safe Columbus Program which would pay for staffing, equipment, supplies and up to $100,000 in lead-abatement grants to private property owners. In addition to the savings to the City, monies would be provided to local community groups to perform training as well as local contractors to perform the abatement projects.

ATTACHMENT A

TABLES AND MAPS

PROGRAM IMPACT
1995 - 1997

YEAR	CHILDREN SCREENED	EBL'S ≥ 10	EBL'S ≥ 15	EBL'S ≥ 20	EBL'S ≥ 45	PERCENT EBL
1995	10,301	814	317	156	7	7.90%
1996	10,270	763	323	144	7	7.43%
1997	10,648	684	244	126	7	6.42%
TOTALS	31,219	2,261	884	426	21	7.24%

IMPACT ON TOP 10 (INNER-CITY) ZIP CODES

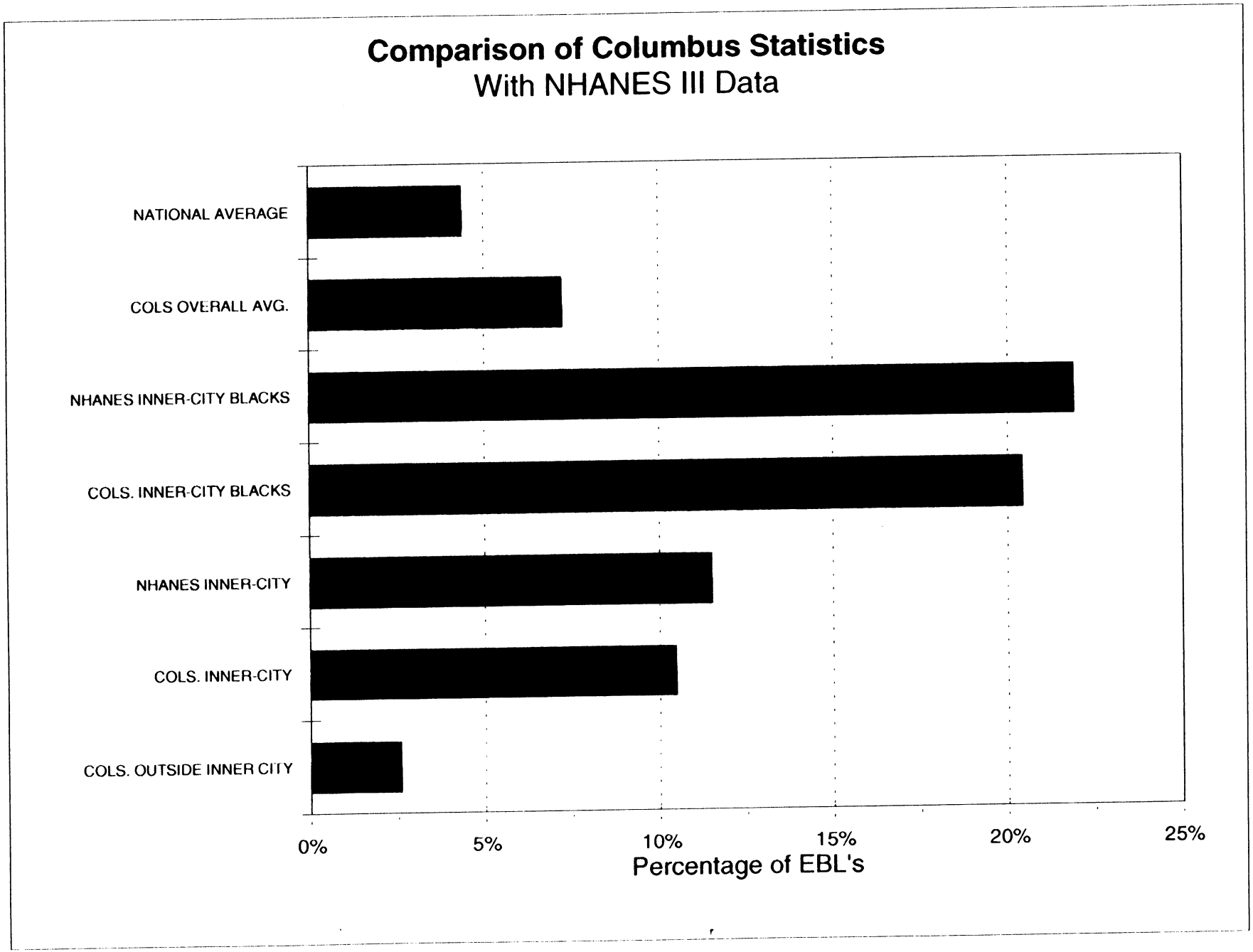
1995	6,318	705	273	137	5	11.16%
1996	6,014	647	279	123	7	10.76%
1997	6,065	576	203	107	5	9.50%
TOTALS FOR TOP 10 ZIPS	**18,397**	**1,928**	**755**	**367**	**17**	**10.48%**

BLOOD LEADS REPORTED FROM 1995-97

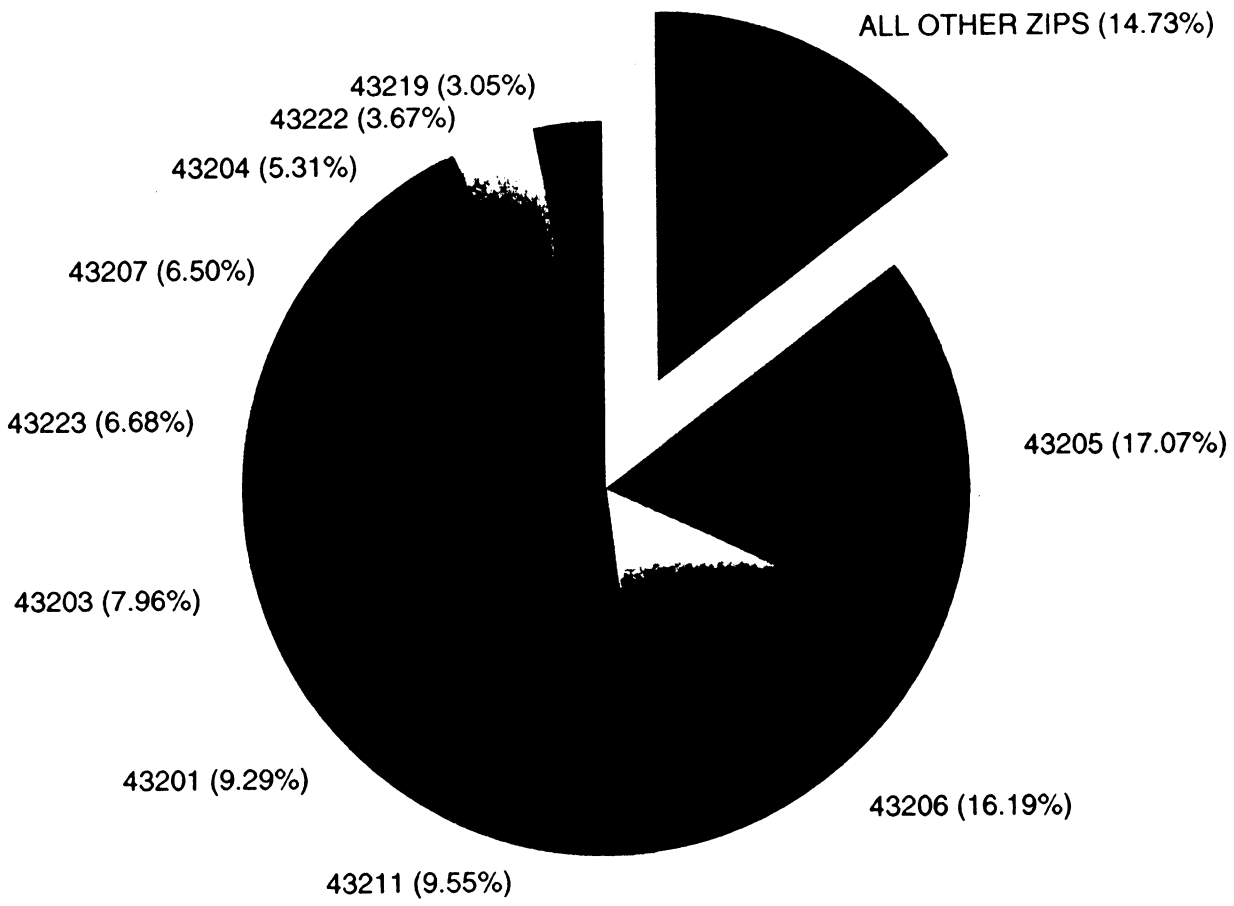
COMPARISON OF INNER CITY RESULTS BY EBL'S REPORTED									
ZIPS	**CHILDREN**	**EBL**	**EBL 15+**	**EBL 20+**	**EBL 45+**	**EBL %**	**>15 %**	**>20 %**	**>45 %**
TOTALS	31,219	2,261	884	426	21	7.24%	2.83%	1.36%	0.07%
TOP 10 ZIPS	18,397	1,928	755	367	17	10.48%	4.10%	1.99%	0.09%
MAX IN TOP 10 ZIPS	2,802	386	155	75	5	19.40%	7.79%	3.67%	0.37%
MIN IN TOP 10 ZIPS	560	69	21	13	0	3.87%	1.18%	0.73%	0.00%
TOTALS FOR TOP 10 ZIPS	**18,397**	**1,928**	**755**	**367**	**17**	**10.48%**	**4.10%**	**1.99%**	**0.09%**
ALL OTHER ZIP CODES	12,822	333	129	59	4	2.60%	1.01%	0.46%	0.03%
PERCENT OF TOTAL REPORTED FROM TOP 10	**58.93%**	**85.27%**	**85.41%**	**86.15%**	**80.95%**				

COMPARISON OF COLUMBUS STATISTICS WITH NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (NHANES III REPORT)

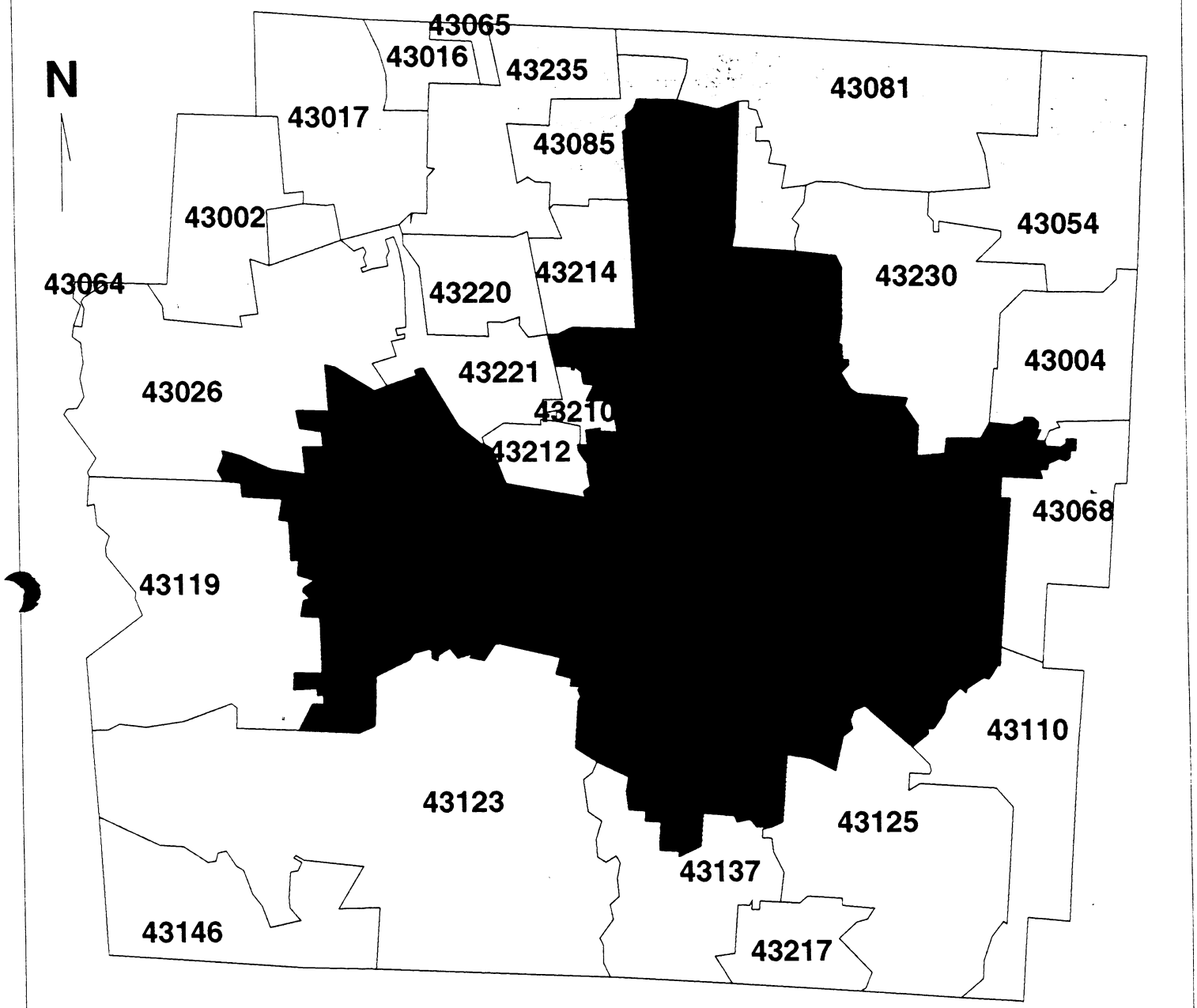
NHANES III DATA (For 1991-1994)	CITY OF COLUMBUS (For 1995-1997)
21.9% of black children living in older housing had elevated blood lead levels ($\geq$ 10 ug/dL).	20.44% of black children living within the target zip codes had blood leads $\geq$ 10 ug/dL.
11.5% of children living in older housing in large urban areas had elevated blood lead levels. (16.4% of poor children living in older housing had elevated blood lead levels.)	10.48% of all children living within the target zip codes had blood leads $\geq$ 10 ug/dL.
4.4% of all children had elevated blood lead levels.	7.24% of all children had elevated blood lead levels.


Comparison of Columbus Statistics
With NHANES III Data
NATIONAL AVERAGE
COLS OVERALL AVG.
NHANES INNER-CITY BLACKS
COLS. INNER-CITY BLACKS
NHANES INNER-CITY
COLS. INNER-CITY
COLS. OUTSIDE INNER CITY
0%
5%
10%
15%
20%
25%
Percentage of EBL's

INNER CITY ZIPS VS. REMAINDER
OF CITY - EBL'S REPORTED



FRANKLIN COUNTY DATA
1995-1997



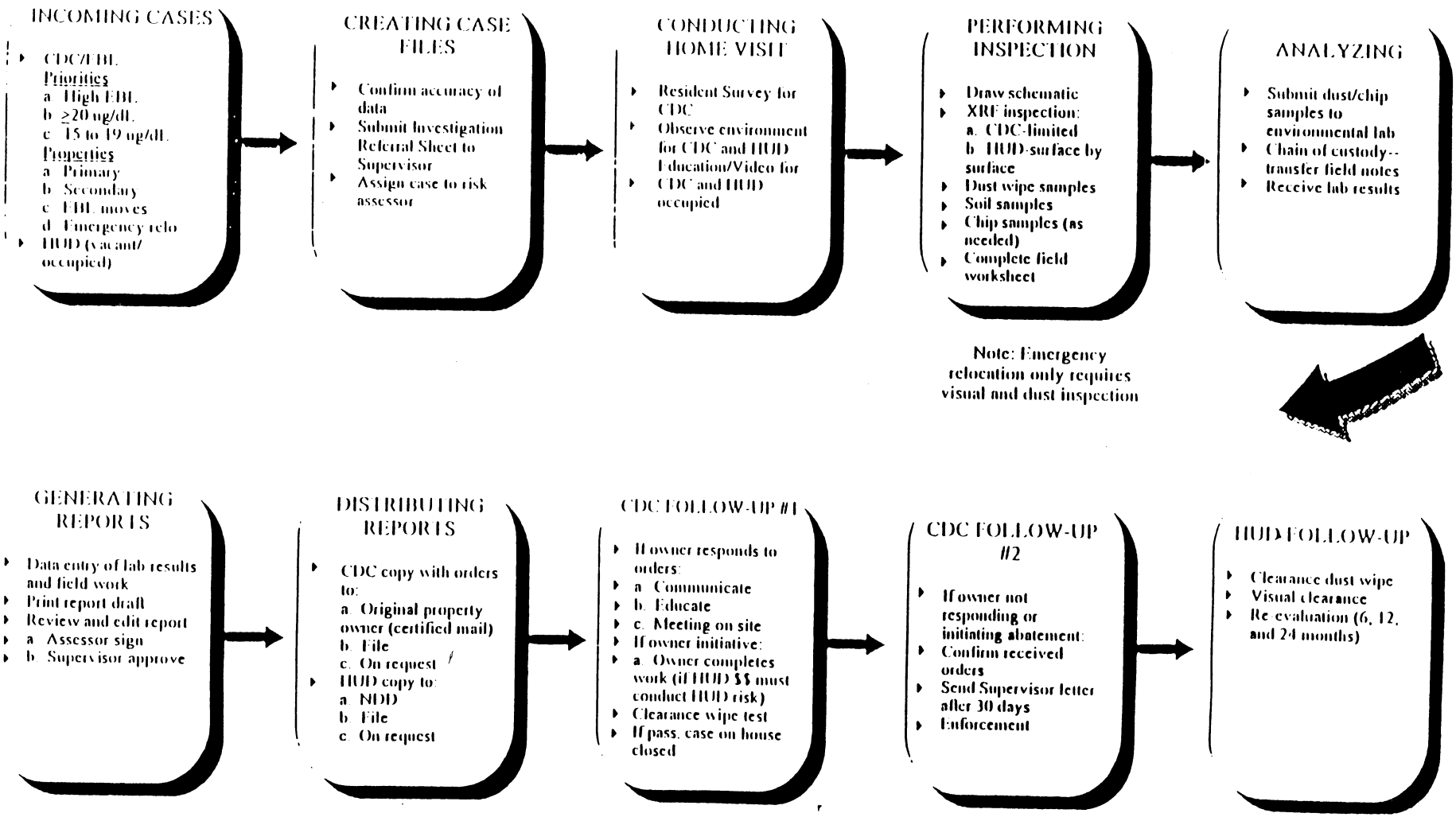
MAP OF ZIP CODES IN FRANKLIN COUNTY SHADED BY NUMBER OF EBL'S REPORTED

300 to 386	(2)
200 to 299	(2)
100 to 199	(4)
50 to 99	(2)
10 to 49	(9)
0 to 9	(26)

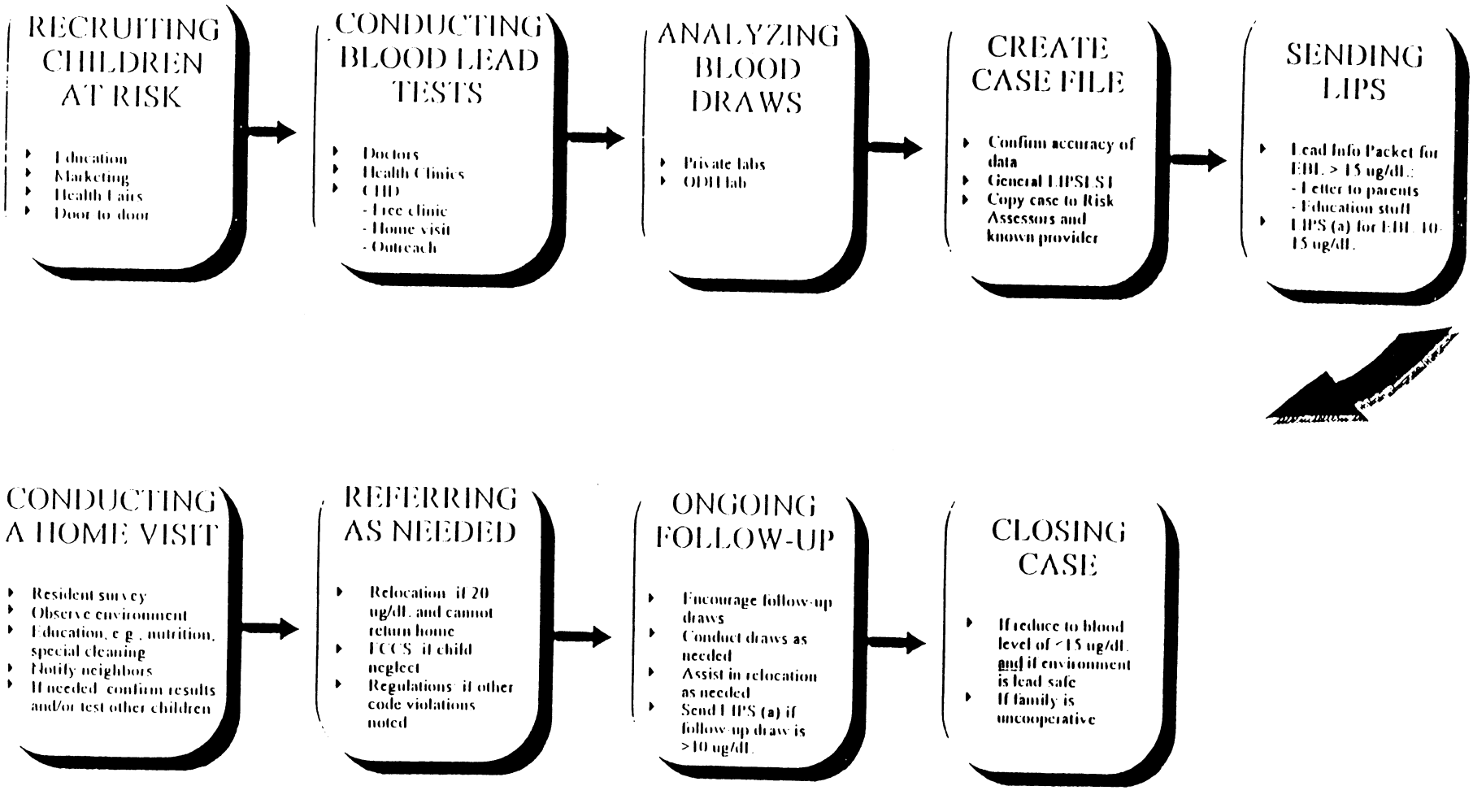
ATTACHMENT B

FLOW CHARTS OF RISK ASSESSMENT & MEDICAL CASE MANAGEMENT PROCESSES

LEAD RISK ASSESSMENT FLOWCHART



NURSING FOR LEAD POISONED CHILDREN FLOWCHART



ATTACHMENT C

Report of the
Environmental Science Advisory Committee
(ESAC REPORT)

FINAL REPORT OF THE ENVIRONMENTAL SCIENCE ADVISORY COMMITTEE ON THE LEAD AND COPPER RULE OF THE FEDERAL SAFE DRINKING WATER ACT

March 31, 1998

ESAC Argument for Federal Waver From lead /copper Rule Requirements for Sampling and Corrective Actions

Introduction

The City of Columbus tested drinking water samples in accordance with the Federal Safe Drinking Water Act in 1992 and 1997. In 1997 the city failed to meet the guidelines by having a 90% percentile lead concentration in tap water sample greater than 15 µgm liter. This exceedance under the Safe Drinking Water Act required the City to initiate a number of testing and corrective actions to reduce lead in the city water distribution system.

The purpose of the Act is to reduce the amount of lead ingested. especially for young children as part of an overall lead poisoning prevention strategy. US EPA regulations concerning means to reduce sources of lead exposure in drinking water only address finished drinking water entering the distribution system. However the regulation defines a water system as being out of compliance with this rule if the lead or copper concentration at "...any sampling point is greater than the maximum permissible concentration...."

A four-step corrective action program is mandated by the US EPA and Ohio EPA-

1) application of source water control measures.
2) application of corrosion control in the distribution system.
3) lead service line replacement. and
4) public education.

The last two measures apply when the "action level" of 15 µgm/liter is exceeded. the presumption then being the corrosion control program has failed to reduce lead concentrations to below desirable levels. This regulatory provision creates a situation whereby the Public Water System (PWS) operator must take actions to reduce the role of lead service lines in creating the exceedance of the "action level".

The operator has two choices:
1.) to expend large sums of money on sample collection and analysis of drinking water in customers' lines to detect areas where the lead service lines are presumed to have resulted in in-house water lead levels greater than 15 µgm/liter.

2.) spend even more money replacing lead service lines under the assumption that this is what lead to elevated or unhealthy lead concentrations in drinking water. However once triggered the requirements to conduct additional in-house water samples or to replace lead service lines can be eliminated when there are 2 consecutive sampling rounds of drinking water where the results are below the "action level" for lead

As we demonstrate here the most effective means of reducing lead ingestion in Columbus water is through an effective corrosion control system. followed by a public education program when lead in tap samples still exceeds an "action level". This approach is supported by technical and other data cited in the Federal preamble to the proposed rule.

Neither the additional in-house sampling nor direct replacement of lead service lines will reduce the number of homes with lead exceedance or reduce the 90TH percentile concentration of lead water samples.

We will show that the exceedance is due to in-house lead sources: home plumbing fixtures and lead solder. Lead service line replacement and additional testing beyond the regularly planned samples will not yield meaningful benefits and completely ignores this major source of lead contamination.

First Argument point:
We used an epidemiological technique to assess whether the lead service lines were causing the elevations in lead in tap water samples. Epidemiologists use a statistical test to explore associations between exposure and disease. They look at who was exposed to an agent that might cause disease and then look at who had the disease. They would use this to look for cause of food poisoning, an association between a food and disease.

Relative Risk (RR) is a measure of how likely an agent or event is to cause the disease or outcome. If the RR is 1, there is no association between them. The larger it is, the more likely the agent is to have "caused" the outcome. The smaller (below 1) the RR is, the more likely it is to be negatively associated with the outcome. This is typically called a "protective" effect because with a very small RR the agent is associated with less than expected occurrence of the outcome. As an example we put numbers into a 2 X 2 (or contingency) table and calculated the association between them. We find that 30 of 90 people at a reception were ill. Eight ate the egg salad.

THE EXAMPLE

Exposure	Got Ill	Not ill
Ate egg salad	8	16
Did not eat egg salad	22	44

We calculated the Odds Ratio (OR) (equal to the Relative Risk in this example), which turns out to be 1.0. Recall that the further the OR is from 1, the stronger the apparent association. In this case there was no significant association between eating egg salad and becoming ill. Egg salad, which is a frequent cause of food poisoning, was not responsible in the example.

We applied this same process to the case in hand: lead service lines and elevated lead in tap water samples. The presence (or absence) of a lead (Pb) water service line is equivalent to exposure to a "disease causing agent", and the lead concentrations in the tap water greater than 15 µgm/liter are defined as the "illness" that might be associated with exposure to the suspected agent. We combined data from 1997 and 1992 first and second round samples of household tap water. These numbers were put into a 2 X 2 (or contingency) table. We calculated an OR, a Chi Square statistic, a significance (or P) value, and 95% confidence limits.

Relative Risk was explained above. Chi Square is a statistical test of how close what you found is to what you expected. The P value tell how likely you were to get the Chi Square by chance occurrence. and the Confidence Limits are a measure of the variability of the Relative Risk measurement.

Columbus Water Department Water Samples 1992 – 1997 in houses with lead service lines and houses without lead service lines

	PB>15ugm/liter	PB <15ugm/liter	*Totals*
Service lines with Pb (–)	4	147	151
Service lines without PB (-)	40	115	155
Totals	44	262	306

The Relative Risk we calculated to be 0.1. Statistically the number could be as low as 0.04 or as high as 0.28 (the 95% Confidence limits). In all cases is well below 1.

If having a lead service line was the cause of elevated lead in water samples. the Relative Risk would have been much greater than 1.0. The Chi Square statistic was 33.3 with an associated significance value. P<0.000001. This indicates whether this RR might have occurred by chance. We are more than 99.99999% sure that the statistic did not occur by chance. The usually accepted level indicating statistical significance is when the P is less than 0.05. In our case. P was far less than that. Not only is there no strong positive association of lead service lines and elevated lead concentration in tap water. but we were more likely to not have elevated lead concentrations in water samples when the service lines were made of lead.

The negative association of service lines and elevated lead in tap samples is supported by data discussed by the US EPA in the preamble to the draft lead copper rule found at 53 FR 31527:

> [t]he occurrence of lead and copper contamination emanating from corrosion of plumbing systems within individual residences and other buildings introduces a wide source of potential variability among lead and copper levels that will be present in water samples taken at the tap.
>
> [a] single measurement of the lead or copper level at an individual tap is not a meaningful measure of the efficacy of any corrosion control treatment that is being applied because lead and copper levels at the tap can vary for reasons other than treatment effectiveness. Since the resulting lead and copper levels will vary from system to system...it is technologically infeasible to ascertain whether the lead or copper level at a tap at a single point in time represents effective application of best available treatment (BAT) technology, assuming BAT is optimal corrosion control treatment.

In discussing the results obtained from houses with lead service lines. US EPA notes at 53 FR 31535:

> The studies cited above as well as unpublished data from two other cities ... indicate that not all houses with lead service lines have high lead levels at the tap, especially where water is relatively non-corrosive. The reasons for this vary. One possible explanation is that over time an insoluble protective coating can build up on the interior surface of the lead pipe, preventing (or reducing) the leaching of lead into the water....Given the available data, EPA cannot currently quantify on a national basis, the contributions of lead service lines and other lead connections to lead levels at the tap, or the anticipated change in lead levels after corrosion control treatment is in place.

In the preamble to the final rule, US EPA notes at 56 FR 26475:

> [i]n most cases lead and copper in drinking waters is the result of corrosion of lead and copper bearing materials in household plumbing. EPA agrees that water systems should not be held directly responsible for plumbing materials within private homes. The Agency believes, however, that water systems can control the main contributor to dissolution of lead and copper plumbing materials - corrosivity of the water.

Conclusion.

It is extremely unlikely that having a lead service line is associated with having a water sample with lead greater than 15 µgm/liter of water. There is no evidence that lead in the water samples came from the lead in the service lines, and there is strong evidence that the lead lines are not a significant source of the lead in the tap water samples. In simple terms samples from homes with without lead service lines were 10 times as likely to have elevated lead in the water than were Columbus homes with the lead service lines. (See 53 FR 31535). This is not conclusive evidence that the lead service lines did not add any lead to drinking water in any sample.

Second argument point.

Data collected using the EPA mandated methodology is highly unreliable. The methodology results in highly variable results. Having a one-time exceedance does not necessarily indicate that the "real" 90th percentile concentration of lead in the samples exceeded the allowable amount in the entire population. Procedural errors in collecting, and sampling variability could have a very large influence on results of the small number of samples taken in each sampling round.

Re-sampling of the tap water in homes tested in 1992, using the exact methodology as in the first sample, produce strikingly different results. In homes without lead service lines, 10 samples were greater than 15 µgm/liter lead. Resample data showed that levels increased in 2 of 9 samples and decreased to less than 15 µgm/liter in the other 7 samples. That is, only 5 samples greater than 15 µgm/liter on the first sample remained elevated on the repeat sample.

Repeating these samples on a different day, but flushing the water in all taps for about 30 seconds yielded results for all samples that were less than 15µgm/liter.

The lack of good reproducibility of sampling results was also a cause of concern to the US EPA as discussed in 53 FR 31527:

> [b]ecause of the variability of the occurrence of lead and copper within and among water systems, the Agency is unable to select a single level of lead or copper in drinking water that indicates whether a system has implemented optimal corrosion control treatment. Unfortunately there is no known reliable index or measure of water corrosivity towards lead and copper plumbing materials either. Therefore, EPA is proposing treatment requirements to control lead and copper as corrosion by-products.

In the preamble to the final rule, US EPA states the following (56 FR 26474):

> [d]ata indicate that the variability in tap levels can persist even in cases where water quality conditions are kept relatively constant.
>
> [E]PA analyzed data from several water systems to evaluate the variability in tap water lead and copper levels over time both within a system...and within a home....The results in Table 3 indicate that tap water lead levels in selected Chicago homes varied considerably when collected over a 1 month period. The results for Newport News, New Bedford, Boston, and Bennington also indicate highly variable lead levels in the same house from month to month.

We observed the same pattern of highly variable results reported by the US EPA in most of the studies it cited. Flushing the water to clear the water standing in in-house lines and in faucets reduces the concentration of lead to well below the 15 µgm/liter standard. In the first round 1997 data, all of the samples with more than 15 µgm/liter lead came from faucets with a swivel handle. These faucets have a metal to metal contact and rotate (grind) to metal surfaces together ever time the water in turned on or off, or the temperature changed. This could easily free small particles of lead containing metal, increasing the solubility of the lead in water. This would increase the level of lead in water that is not flushed for a few seconds. The method also suffers from having the homeowners being responsible for collecting the samples. Poor attention to following the procedures may, and in our case probably did, cause considerable variability in lead concentrations on repeat samples.

One house sampled in 1997 with a lead service line and a water concentration greater than 15µgm/liter was re-sampled on different days. Without flushing: the worst sample was 232 µgm/liter lead, other samples were 4, 4, 76, 3 µgm/liter lead. After a 2-minute flush, the results were 0, 3, 0, 0, 0 µgm/liter lead.

These results are further evidence that data can be highly variable, and that flushing the water setting overnight inside the house pipes and faucets for 2 minutes reduces the lead concentration in the water to well below the "action level". Flushing would not decrease the lead level if the lead were coming from the service lines, not the pipes in the house. In other words the lead came from sources inside the house, not the service lines.

Third Argument

In relation to this point combined with previous discussions, the US EPA provided this summary of the proposed regulatory approach at 53 FR 31529:

> [I]n conclusion, most of the lead and copper found in drinking water at the tap is added by plumbing after the water leaves the treatment plant. In a few systems, lead and/or copper may occur at high levels in the source water. Therefore, the most important step a public water system can take to control lead and copper levels at the tap is to install optimal corrosion control treatment. However, it is technically infeasible to set MCLs at the tap for these contaminants because no single lead or copper measurement, or any other water parameter, indicate whether treatment was effectively applied, i.e., corrosion control treatment has been optimized. EPA is proposing an NPDWR consisting of a treatment technique requirement that would require optimal corrosion control treatment. In addition, the MPWDWR would require public education when lead levels exceed certain values even after optimal corrosion control treatment.

It is interesting to note that the proposed regulation contained no provision for lead service line replacement.

Conclusion:

The USEPA sampling methodology produces highly variable and therefore unreliable results. Flushing for 30 seconds to 2 minutes greatly reduces the lead concentrations, indicating that the lead source is the plumbing and lead solder inside the houses, not lead service lines.

Fourth Argument

Tap water samples were collected in 100 houses in July-December 1997. There were 50 houses without lead service lines and 50 with lead service lines. The 90 percentile for lead was 3 µgm/liter. Neither the lead nor the copper "action level" was exceeded. The decrease in lead levels resulted from the Columbus Division of Water changing the coagulant and increasing a phosphate that reduced lead solubility.

Thus we do not find any benefit to the citizens of Columbus from the EPA requirements for testing and remediation of lead service lines after failing to meet the guidelines by having a lead concentration in a tap water sample at the 90% percentile greater than 15 µgm/liter.

The samples had such a high variability from place to place and from repeat tests within one home that it renders pointless the requirement for additional testing to find houses with elevated lead in drinking water due to lead service lines.

There was strong evidence that the elevated lead detected in the homes with high lead values were a result of lead leaching from solder in pipes or from brass faucets in those homes. There was no evidence that the elevations could be attributed to lead service lines.

In its proposed rule US EPA agreed with this position and stated at 53 FR 31536:

> [B]ased on its evaluation of the available information EPA considers corrosion control and public education to be effective and feasible methods of reducing lead and copper as corrosion by-products in drinking water. Thus, they are both included as requirements of the proposed rule. Lead service line replacement was also considered. EPA believes that in many cases replacement of lead service lines and connections may reduce the lead levels in tap water. However, there may be temporary risks associated with partial pipe replacement. Because of these potential risks, as well as uncertainty about the effectiveness of partial or complete service line replacement as a final control step after implementation of corrosion control treatment, EPA is not proposing service line replacement as BAT for controlling lead as a corrosion by-product in drinking water. However, EPA...is considering adapting pipe replacement as a requirement of the final rule.

As further discussion of a lead service line replacement program, US EPA provided additional discussion at 53 FR 31546. In this part of the preamble US EPA discusses the type of replacement program being considered (but not proposed in the draft rule.) The following excerpt presents relevant portions of the discussion.

> [U]nder this program, EPA would establish two rebuttable presumptions. The first rebuttable presumption would be that lead service lines and connections contribute to lead levels at the tap...To rebut the presumption and avoid replacing the lead service lines and other connections, the PWS would be required to Monitor each home in the community with a lead service connection or pipe to determine whether the lead service contributes measurable amounts of lead to lead levels at the tap...This presumption must be rebutted for each lead connection the system wishes to avoid replacing.
>
> The second presumption is that the water supplier or controls and therefore can replace, the lead components up to the wall of the building served...Water supplies that rebut the second presumption would have to replace only the portion of each service line and those connections under the ownership or control that contribute a measurable amount of lead to the water.

The fact that EPA was considering rebuttal procedures at the same time as they were considering the lead service line replacement program points directly the high level of uncertainty associated with the benefit of lead service line replacement. The first rebuttable presumption resembles an EPA request for a research project. The preamble is fill with technical discussions on the difficulty of identifying the sources of lead in drinking wet or and the difficulty in differentiating between lead contributed by the service line versus that contributed by indoor plumbing and fixtures. Nonetheless, EPA presents the first rebuttable procedure as if it were relatively easy. In fact the procedure would likely be quite expensive, especially in light of the fact that EPA was considering that the presumption be rebutted for <u>each line the system wished to avoid replacing.</u>

We do not recommend that the procedure be applied for each lead service line the PWS wished to avoid replacing. Instead, the results should be used to further support the argument that EPA's

process has a high cost associated with low benefits with lead service line replacement and continued additional samples at residences.

Other Data Needs

If these arguments are not persuasive to the US EPA and Ohio EPA we recommend consideration of a further test to determine the source contributions of lead to elevated tap water samples that could be used to rebut EPA's first presumption. A method of determining the possible source of lead as service line, faucet or in house solder is available, although it would be expensive and the results are not guaranteed.

Lead naturally contains a very small amount of radioactive isotopes. The ratio of several radioactive lead isotopes can be determined. Different geological sources of lead have different and distinctive ratios of these isotopes. If lead in the service lines was mined from different source (many years ago) than the lead in solder, determining which pattern the lead in the tap water sample resembled would show the original ore source of the lead. Confirmation of the source could be made by comparing the lead in the tap water to samples from a service line and from solder scrapped from house pipes.

ATTACHMENT D

SUPPORT LETTERS

American Water Works Association - Ohio Section
Environmental Health Watch
Legal Aid Society of Columbus/Help End Lead Poisoning (HELP)
St. Stephen's Community House
Columbus Department of Trade and Development
Priorities Partners
Legal Aid Society of Cincinnati/Help End Lead Poisoning (HELP)
Ohio Department of Health

OHIO SECTION

AMERICAN
WATER WORKS
ASSOCIATION

November 12, 1998

Mr. Gary Garver, Director
Childhood Lead Poisoning Prevention Program
Columbus Health Department
181 Washington Blvd.
Columbus, Ohio 43215

Dear Mr. Garver:

Having reviewed the Lead-Safe Columbus/XL Community Pilot Program Proposal, I am impressed with the creativity of this approach to reduce lead poisoning exposure hazards for high risk children in Columbus. The proposal is a cost-effective use of available funding to target the highest danger exposure pathways for the most vulnerable children.

Through my participation in the AWWA Ohio Section, I have worked with the Columbus Health Department staff and have found them to be highly competent and dedicated public employees. Based on my knowledge of the Columbus Lead Program, I know that it has the capability to effectively implement the Lead-Safe Columbus/XL Community Pilot Program.

I wish you the good luck in seeking approval to go forward with your innovative, cost-effective and much needed proposal.

Sincerely,

Gary Hoffman
State Chair

GH:cjg

EHW Environmental Health Watch

4115 Bridge Ave., #104
Cleveland, OH 44113
216/961-4646
Fax 961-7179
E-mail e-h-w@ehw.org

November 10, 1998

Mr. Gary Garver, Director
Childhood Lead Poisoning Prevention Program
Columbus Health Department
181 Washington Bldvd.
Columbus, OH 43215

Dear Mr. Garver:

Having reviewed the Lead-Safe Columbus/XL Community Pilot Program Proposal, I am impressed with the creativity of this approach to reduce lead poisoning ~~exposure~~hazards for high risk children in Columbus. The proposal is a cost-effective use of available funding to target the highest danger exposure pathways for the most vulnerable children.

Through my participation in the HELP (Help End Lead Poisoning) Coalition, I have worked with the Columbus Lead Poisoning staff and have found them to be highly competent and dedicated public health officers. Based on my knowledge of the Columbus Lead Program, I know that it has the capability to effectively implement the Lead-Safe Columbus/XL Community Pilot Program.

Environmental Health Watch has been involved lead poisoning prevention work in the Cleveland area for the past seven years. In joint projects with the Cleveland Department of Public Health, we have trained disadvantaged workers to be lead abatement specialists, conducted lead hazard control work with our own crews, educated care givers on how to reduce children's exposure to lead, and researched the effectiveness of lead hazard control programs.

I wish you the good luck in seeking approval to go forward with your innovative, cost-effective and much-needed proposal.

Sincerely,

Stuart Greenberg
Executive Director

HEALTHY HOUSE PROJECT

A Joint Program of the City of Cleveland Department of Public Health & Environmental Health Watch

Member of GREATER CLEVELAND Community Shares

The Legal Aid Society of Columbus

SERVING FRANKLIN, DELAWARE, MADISON, MARION, MORROW AND UNION COUNTIES

MAIN OFFICE
40 West Gay Street
Columbus, Ohio 43215
(614) 224-8374
(614) 224-4514 FAX

Marcia L. Brehmer
Executive Director

November 13, 1998

Gary Garver, Director
Childhood Lead Poisoning Prevention Program
Columbus Health Department
181 Washington Blvd.
Columbus, Ohio 43215

Dear Mr. Garver :

The Legal Aid Society of Columbus, founded in 1954, is a legal services program that is committed to providing high quality legal services to low income and elderly individuals through-out a six county area. The program provides legal assistance in such areas as landlord-tenant, domestic relations, domestic violence, consumer debt, and government benefits.

The program has worked with the Columbus Health Department Lead Program as part of a statewide taskforce effort under the HELP (Help End Lead Poisoning) umbrella. Legal Aid has found that the Columbus Lead Program Staff is both committed and knowledgeable on the health risks and issues involving lead, especially as it effects the most vulnerable, children.

Having reviewed the Columbus Health Department's XL Community Pilot Program Proposal, Legal Aid founds the proposal both a cost-effective and innovative approach to reducing lead exposure hazards for high risk children in Columbus. Legal Aid supports the Columbus Health Department's XL Community Pilot Program Proposal and wishes you much luck in seeking approval of this much needed approach to the lead problem.

Sincerely,

Marcia L. Brehmer

Marcia L. Brehmer
Executive Director

St. Stephen's Community House

1500 East 17th Avenue • Columbus, Ohio 43219
(614) 294-6347 • Fax (614) 294-0258

Judith Stattmiller
Executive Director

November 19, 1998

Gary Garver
Director, Childhood Lead Poisoning Prevention Program
Columbus Health Department
181 Washington Blvd.
Columbus, Ohio 43215

Dear Mr. Garver:

St. Stephen's Community House offers a wide variety of services to the families of the Linden area. Services include: Day Care Center, Parent Education Programs, Elderly Care Program, Youth Activities, Neighborhood Health Center and Emergency Services Unit. Many of the families served have children school-age or younger. Through our vast clientele base and success with community outreach and organization, St. Stephen's has been successful in implementing the Columbus Lead-Safe Program in a community-based agency.

St. Stephen's Community House has been working with the Columbus Lead- Safe Program of the Columbus Health Department since June, 1996. Agency staff has participated in the Train the Trainer Program. We facilitate Lead-Safe Prevention Workshops for families every other month. Staff has also facilitated educational groups for primary-age youth in regards to the prevention of lead poisoning. We have facilitated lead poisoning testing for youth in our facility along with the assistance of Diana Brady.

St. Stephen's Community House endorses projects designed to assist families in providing safe, healthy and supportive homes. We have reviewed the **XL Community Pilot Program** and we are in full support of the proposed program.

If you have any questions or need any additional information, please contact me at 294-6347.

Yours Truly,

Judith Stattmiller
Executive Director

City of Columbus
Mayor Gregory S. Lashutka

Department of Trade and Development

George J. Arnold, Director

November 18, 1998

Gary Garver, Director
Columbus Childhood Lead Poisoning Prevention Program
Columbus Health Department
181 Washington Blvd.
Columbus, OH 43215

Dear Mr. Garver:

The Columbus Department of Trade and Development will participate as a stakeholder in the XL Community Pilot Program and gladly serve on the Advisory Council. The proposal to the U.S. EPA is aligned with our own lead poisoning prevention initiatives through the HUD Lead-based Paint Grant. The XL Program will strengthen the current partnership between our departments in the Lead-Safe Columbus Program and will enhance our efforts to reach more of the citizens we jointly serve.

As you know, the grants we provide for lead hazard control are time-limited and fall short of meeting the future demand of families with lead poisoned children. The XL proposal will not only provide resources to help meet current and future needs, but also could be used to leverage other resources in the community.

We look forward to working with you on this innovative project. If we can be of further service in the proposal process please contact Kim Stands at 645-7571.

Sincerely,

Gail Gregory
Deputy Director
Housing and Community Services

GAG:ks
cc: file

Director's Office
W. Gay St.
Columbus, OH 43215-9040
(614) 645-8591
(614) 645-6295 FAX
(614) 645-6802 TDD

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109 N. Front St.
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(614) 645-7855 FAX
(614) 645-6407 TDD

Building and Development Services
1250 Fairwood Ave.
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(614) 645-3293 TDD

Economic Development and Planning Services
109 N. Front St.
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(614) 645-7855 FAX
(614) 645-6407 TDD

Housing and Community Services
50 W. Gay St.
Columbus, OH 43215-9040
(614) 645-7795
(614) 645-6675 FAX
(614) 645-6802 TDD

PRIORITIES  PARTNERS

November 30, 1998

Gary Garver, Director
Columbus Childhood Lead Poisoning Prevention Program
Columbus Health Department
181 Washington Boulevard
Columbus, OH 43215

Dear Mr. Garver,

As a member of the Board of Directors of Priorities Partners Inc., I would like to offer this letter of support for the city's proposed XL Community Pilot Program to reduce the potential for city residents, especially children, to be exposed to lead in the environment.

Priorities Partners Inc. (PPI) is a non-profit group dedicated to promoting the recommendations of the city's Priorities 95 Project. The Priorities 95 Project was a city-wide comparative risk project whose goal was to identify, rank, and develop solutions for environmental problems facing the Columbus metropolitan area. More than 200 volunteers gathered, organized, and summarized environmental data. The result was an environmental action plan for the city, consisting of nearly 200 recommendations. PPI seeks to work with the city to implement these recommendations. PPI reviews major initiatives proposed by the city to determine whether these policies are compatible with or promote the recommendations of the Priorities 95 Project.

The Priorities 95 Project listed a number of recommendations to reduce the risks of lead exposure to city residents, especially children. These included:

R108: Current lead awareness educational programs are effective and need to be expanded. Efforts targeting pregnant women should be part of a comprehensive effort.

R109: New methods need to be developed to identify housing with lead hazards and encourage creation of lead-safe housing.

R110: Alternative funding sources need to be developed to encourage creation of lead-safe housing.

R111: The city needs to prepare for developing alternative funding for all Columbus Lead

Poisoning Prevention Program activities against the eventuality of reduced or eliminated federal support, so that services can be maintained at adequate levels.

R112: Evaluate effectiveness of activities that take place after a child is diagnosed with high lead levels.

A review of the city's proposed XL Community Pilot Lead-Safe Columbus Program as presented in the materials provided to PPI has led the Board to believe that this proposal is fully compatible with the goals of the Priorities 95 Project. Elements of the city's proposal appear to go a long way towards implementing all of the Priorities 95 recommendations regarding the reduction of lead risks in the community and listed above. This is especially true of the proposal's emphasis on the development of expanded lead risk education and lead abatement programs and the provision for a long-term source of local funding for these programs. As such, the Board of PPI would like to go on the record as fully supporting the city's proposed plan.

A member of PPI will be selected to serve on the Lead-Safe Columbus Advisory Council to assist in community planning and to help assure the effectiveness of the entire program.

If you have any questions regarding PPI and our support for this proposal, please contact either Bob Frey (466-1069) or Dana Warner (645-6772).

Sincerely,

Robert C. Frey, Ph. D.
Board Member, PPI (Water Issues)

cc. Dana Warner, Board Chair, PPI
Joanne Leussing, President, PPI
Linda Norris, Secretary, PPI

LEGAL AID
SOCIETY OF
CINCINNATI

LEGAL SERVICES IN HAMILTON, CLERMONT AND BROWN COUNTIES

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Cincinnati, Ohio
45202

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Facsimile
(513) 241-0047
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1-800-582-2682
TDD
(513) 241-6061

December 11, 1998

Gary Garver, Director
Columbus Childhood Lead
Poisoning Prevention Program
Columbus Health Department
181 Washington Boulevard
Columbus, OH 43215

Dear Mr. Garver:

I am writing to state my wholehearted support for the XL Community Pilot Program that has been proposed by the Columbus Childhood Lead Poisoning Prevention Program. I have read through the outline of the XL proposal, and I believe that it is an excellent alternative to strict adherence to the Lead and Copper Rule requirements. I believe it will better serve the needs of the Columbus community, especially the young children who are in danger of being poisoned.

I learned about the XL proposal through my work on the Health End Lead Poisoning (HELP) statewide coalition. I serve on the coalition with Diana Brady and Jim Haley from your program.

I have worked extensively for the past decade in the area of childhood lead prevention. I serve on a number of committees in Cincinnati to establish and maintain a comprehensive childhood lead prevention program. Although I do not live in Columbus, I am happy to contribute to the community planning aspects of the proposal in any way I can.

If you have any questions or concerns regarding this letter, or you would like further comments from me, please do not hesitate to contact me at the Legal Aid Society of Cincinnati.

Very truly yours,

Marcheta L. Gillam
Attorney at Law

df

OHIO DEPARTMENT OF HEALTH

246 N. HIGH STREET
Post Office Box 118
Columbus, Ohio 43266-0118

Telephone (614) 466-3543

GEORGE V. VOINOVICH
Governor

WILLIAM RYAN
Director of Health

DEC 9 1998

Gary Garver, Director
Columbus Childhood Lead
Poisoning Prevention Program
Columbus Health Department
181 Washington Boulevard
Columbus, Ohio 43215

Dear Mr. Garver:

The Ohio Department of Health (ODH) has for many years provided statewide coordination of Ohio's childhood lead poisoning prevention efforts. Data collected by ODH clearly demonstrate an ongoing threat to our children posed by lead in the environment. Based upon Centers for Disease Control and Prevention standards, Ohio has nearly 8,000 children poisoned by lead each year. Data collected by this department continue to show the major source of contamination is from lead in paint, dust and soil. The ODH provides funding for regional lead education and for comprehensive community based programs. ODH is also the central repository of data related to blood lead analysis, as required by the Ohio Revised Code.

The ODH has enjoyed many years of cooperative efforts with your department and has provided funds for your community based program and for regional educational efforts. The Columbus Health Department has demonstrated innovation and leadership in this continuing environmental effort. Your agency also has demonstrated competency in the administration of grant programs awarded by this department.

We have reviewed your proposal, the Columbus Health Department XL Community Pilot Program, and believe that it will be both beneficial and cost effective. Clearly the lead threat to Columbus children is based on sources related to lead in paint and this proposal will allow your agency to appropriately target resources. We support your proposal and also would be eager to have Richard Bunner, Program Administrator, Ohio Childhood Lead Poisoning Prevention Program serve on your Lead-Safe Columbus Advisory Council. If we can be of any further assistance please let us know.

Sincerely,

Lou Ellen Fairless
Director of Health