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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Final Agency Lead Strategy

FROM: Joseph S. Carra, Deputy Director
Office of Toxic Substances

TO: Office Directors Lead Committee

Attached is the final version of the Agency-Wide Strategy to Reduce Lead Emissions. This strategy was the basis for the Administrator's Senate testimony on lead on February 21, 1990.

This strategy represents a great deal of hard work by all of our offices. I am particularly proud of the coordination that has taken place to produce this consolidated agenda to address lead contamination, and am looking forward to continuing this coordination as we move to implement this strategy.

Attachment

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- Daniel J. Fiorino, Office of Policy Analysis (PM-221)
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U.S. ENVIRONMENTAL PROTECTION AGENCY

STRATEGY FOR

REDUCING LEAD EXPOSURES

* February 21, 1991 *

U.S. ENVIRONMENTAL PROTECTION AGENCY
STRATEGY FOR
REDUCING LEAD EXPOSURES

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EXECUTIVE SUMMARY

INTRODUCTION

This document presents the coordinated strategy of the U.S. Environmental Protection Agency to address the significant health and environmental problems our society is facing as a result of lead pollution. Lead is a multi-media pollutant; accordingly, the Agency plans to address lead contamination by coordinating its authorities across programs.

Because the strategy includes research, regulatory, enforcement, educational and training activities, we envision this document will be a living document, and that it will evolve as we begin to implement its various components. Several aspects of the strategy will entail continued coordination with other branches of government while others, such as regulations, will require full compliance with the Agency's rulemaking requirements.

THE PROBLEM

Lead is a highly toxic metal, producing a range of adverse health effects, particularly in children and fetuses. Effects include nervous and reproductive system disorders, delays in neurological and physical development, cognitive and behavioral changes, and hypertension. Adverse effects have been found at lower and lower blood lead levels, and the Centers for Disease Control (CDC) anticipate lowering its level of concern from 25 µg/dl to a level within the range of 10 to 15 µg/dl.

Elemental lead is indestructible, and ubiquitous in the environment. Although the percentage of children with elevated blood lead has declined substantially over the last twenty years, with average blood lead levels dropping from 15 to 5 µg/dl, an estimated 15% of children still have blood lead levels over 10 µg/dl. The three major sources of elevated blood lead are lead-based paint, urban soil and dust (contaminated mainly by lead-based paint and gasoline), and lead in drinking water (moderate exposures in large populations). Other sources include stationary point sources, Superfund sites, municipal waste and sewage sludge incinerators, and use of lead in products.

EPA'S STRATEGY

The goal of the strategy is to reduce lead exposures to the fullest extent practicable, with particular interest in reducing the risk to children, to avoid high blood lead levels. Two objectives will be used to set program priorities and gauge program success: 1) to significantly reduce the incidence of blood lead levels above 10 µg/dl in children while taking into account the associated costs and benefits, and 2) to

significantly reduce, through voluntary and regulatory actions, unacceptable lead exposures that are anticipated to pose risks to children, the general public, or the environment. These objectives will necessarily evolve as we better understand the risks posed by lead.

The strategy includes several major action elements:

- develop methods to identify geographic "hot spots",
- implement a lead pollution prevention program,
- strengthen existing environmental standards,
- develop and transfer cost-effective abatement technology,
- encourage availability of environmentally sound recycling,
- develop and implement a public information program, and
- aggressively enforce environmental standards.

EPA's research program, with other Federal agencies, will define, encourage, and/or conduct research needed to 1) locate and assess, in terms of both geography and media, serious lead risks, and 2) develop methods and tools to reduce those risks. EPA's Lead Research Sub-Committee will continue to define and rank lead research program objectives and activities.

EPA's abatement program focuses on in-place lead, and addresses lead-based paint exposures, urban soil and dust, and Superfund sites. Lead-based paint is the most serious source of children's exposures. Although the Department of Housing and Urban Development (HUD) has primary responsibility for the lead-based paint portion of this program, EPA is providing HUD with technical and administrative assistance. HUD's Lead-Based Paint Task Force, with representation from EPA, CDC, the National Institute of Standards and Technology (NIST) and other Federal agencies, is providing a mechanism for the exchange of information on Federal lead-based paint activities among the various agencies. EPA is funding a number of initiatives in support of reducing risk from in-place lead, and will continue to serve as the focal point and overall manager of technical support to HUD.

Lead-contaminated urban soil is believed to be the next most important source of lead exposure, but relatively little is known about it. Under the Superfund Amendments and Reauthorization Act (SARA), EPA is conducting a pilot program to evaluate effects of removing lead-contaminated soil and dust on children's blood lead.

More than 400 National Priority List sites have lead as an important contaminant. EPA has issued interim guidance on lead soil clean-up levels at Superfund sites, and is working to provide methods for determining site-specific soil levels.

EPA's regulatory and pollution prevention program includes efforts by a number of different offices to examine cost-effective ways to reduce lead exposures using both voluntary and regulatory approaches. This includes actions which will reduce lead exposures as part of larger environmental programs. Included are:

- Lead in drinking water usually occurs at low levels, but affects much of the U.S. population. Lead levels are due to the leaching of lead from components of household plumbing and from public and private water distribution systems. The Office of Drinking Water is finalizing requirements for lead under the Safe Drinking Water Act. Lead-containing materials used in drinking water systems and water coolers have also been banned.

- The Office of Solid Waste has issued a number of regulations involving smelter and other types of lead waste, and is currently reviewing policy in those areas.

- The Office of Toxic Substances is examining the risks related to the use of lead in products. The Office is considering several rules which may restrict lead use in specific products (and possibly impose overall restrictions on use of lead as well) and would encourage environmentally-sound lead-acid battery recycling.

- The Office of Air Quality Planning and Standards is considering revising both the current National Ambient Air Quality Standard for lead and specific standards for smelters.

- Action by the Office of Pesticide Programs has resulted in the cancellation or reformulation of pesticides containing lead, and work to phase out lead will continue where the risks exceed the benefits.

- The Office of Water Regulations and Standards is working on regulations for lead, among other contaminants, in sewage sludge.

- The Office of Enforcement will undertake a major initiative to improve compliance with regulations affecting sources of lead emissions.

STATEMENT OF PROBLEM

HEALTH EFFECTS

Lead is a highly toxic heavy metal. It produces a spectrum of effects, both acute and chronic. Adverse effects include peripheral and central nervous system dysfunction, anemia, and in extreme cases, mental retardation and death. It has no beneficial biologic effect, and current data do not permit establishing a clear threshold for adverse effects.

Fetuses and young children are particularly susceptible to lead. Considerable data suggest a correlation between elevated blood lead (EBL) and delays in early neurological and physical development, cognitive and behavioral alterations, alterations in red blood cell metabolism and vitamin D synthesis, and kidney impairment.

Adults also face health risks. A positive association has been found in adult males between EBL and hypertension. Lead has also been associated with increased risk of cardiovascular disease. Since lead is stored in bone, it may be mobilized during periods of stress, during pregnancy, and among people suffering from osteoporosis. Lead exposures also may play a role in miscarriages and in damage to the male reproductive system.

Blood lead (PbB) is a surrogate for estimating recent exposure. There has been increasing concern about PbB at lower and lower levels over the past 15 years, as adverse effects have been identified at levels not previously recognized as harmful. The Centers for Disease Control (CDC) has repeatedly lowered the PbB level of concern, from 40 µg/dl in 1978 to 25 µg/dl currently, and anticipates lowering this to a level within the range of 10 to 15 µg/dl in the near future.

ENVIRONMENTAL EXPOSURES

As an element, lead is essentially indestructible, and is ubiquitous in the environment. However, there have been large reductions in ambient air lead and food lead concentrations since the late 1970's, primarily due to the phase-down of the use of lead in gasoline and the removal of lead-soldered food cans from domestic production. While no longitudinal or prospective data are available on soil lead, it is likely that reductions in soil deposition have occurred as air emissions declined. This, in conjunction with other factors, has dramatically lowered population PbB. While there has been no recent national survey of human PbB, it is estimated that mean PbB in U.S. children has declined by a factor of three or four, from about 15-20 µg/dl in 1976-80 to approximately five µg/dl today. As the next table

shows, there have been comparable declines in the estimated percent of U.S. children with EBL.[1]

TABLE 1:
Estimated Percentage of U.S. Children under 6 with EBL

PbB	1976-80 (percent)	1990 (percent)
>25 µg/dl	10.7	1.0
>10 µg/dl	91.0	15.0

Thus, substantial progress already has been made in reducing the more acute adverse effects associated with high blood lead levels. As mean general population PbB declined to approximately five µg/dl, the focus of attention has shifted from general population exposures to localized "hot spots". Given the continuing identification of adverse effects at lower PbB levels, however, EPA intends to continue efforts to lower general population exposures as well.

SOURCES OF LEAD

The three major sources of lead contributing to PbB above 10 µg/dl, in descending order of importance, are:

1. **Lead-based paint (LBP):** Most PbB levels in U.S. children above CDC's current level of concern (25 µg/dl) are due primarily to exposures to deteriorating LBP, causing very high PbB in relatively large populations. LBP for residential use was banned by the Consumer Product Safety Commission (CPSC) in 1978. The control of existing LBP in residential units is primarily the responsibility of the homeowners, although the Department of Housing and Urban Affairs (HUD) is responsible for public housing. Programs to assist homeowners and property owners in the abatement of residential LBP is the responsibility of HUD, with EPA and several other agencies providing technical support.

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[1] The estimates in this and the following table were generated by program office staff, using the Agency for Toxic Substance and Disease Registry (ATSDR) report "Nature and Extent of Lead Poisoning in Children in the United States", 1988, and the most recent available information on lead occurrence in various exposure media.

2. **Urban soil and dust:** These were contaminated in the past mainly by LBP and lead in gasoline. The extent and severity of exposures are not well characterized, but both are believed to be large.

3. **Drinking water:** Drinking water generally contributes low to moderate exposures to relatively large populations. Lead contamination is due mainly to lead solder joining water pipes in housing, the past use of lead service lines to connect homes to public water supplies, and the continuing use of lead in brass plumbing fixtures. Lead use in pipes and solder was banned in 1986; however, EPA enforcement of this ban is extremely limited. Revisions to Safe Drinking Water Act (SDWA) regulations will gradually minimize exposures from these sources.

Thus, the major sources of EBL today largely are regional exposures to lead deposited when lead was extensively used in gasoline and paint, and to previously installed lead and lead-soldered pipes conveying drinking water. The next table describes the extent of these exposures.

TABLE 2:
Estimated Number of Children under 6 Exposed to Lead Sources

		Number and percent with PbB >10 µg/dl	
	Total exposed	Number	Percent
LBP, plus urban background	12,000,000	2,000,000	17
Urban soil/dust	12,000,000	?	?
Drinking water	30,000,000	950,000	3.5

Although most EBL in the U.S. today is attributable to one or more of the above sources, there are additional contributions from other sources that add to total lead body burden. The severity of lead exposures from other sources is unclear, although these sources may contribute to very high exposures in smaller populations. These other sources include food and continuing auto emissions, as well as the following sources:

* **Stationary point sources:** Mainly smelters, which cause high PbB in relatively small and local populations. Exposures are due in part to current emissions, and in

part to resuspension of dusts and soil contaminated by past emissions.

* **Superfund National Priority List (NPL) sites:** Approximately 400 of these sites have lead identified as one of the major contaminants, and may have very high soil lead levels.

* **Municipal waste combustors (MWC's):** Presently about 200, with many more planned or under construction. Stack emissions from these sources will be reduced by recently promulgated regulations.

* **Continued use of lead in products or for purposes that could result in high exposure:** For example, the use of lead solder to seal food cans or (illegally) to join pipes conveying drinking water; use in brass plumbing fixtures; use in products (such as paints and solder) used intensively by hobbyists or "do-it-yourselfers"; use in industrial paints, and use in ceramic glazes.

* **Mining sites:** Sites exist where significant residual mine wastes remain. Many of these sites have ongoing activities to remove or remill much of the existing mine waste. The bioavailability of such lead is under investigation.

* **Sewage sludge disposal:** Primarily a problem if the sludge is incinerated without proper controls.

* **Occupational exposures:** This would include secondary exposure of children whose parents are occupationally exposed to lead.

EPA, recognizing the varied sources of lead and the multiple pathways of exposure which are possible, has developed this strategy document to limit lead exposure.

OVERVIEW OF STRATEGY

This section provides a summary of the goal, objectives, and major action elements of EPA's lead strategy.

GOAL

The goal of this strategy is to reduce lead exposures to the fullest extent practicable, with particular emphasis on reducing the risk to children. This strategy document describes the extensive set of actions underway or planned within EPA or other Federal agencies to reduce lead exposure. As appropriate within the context of the various statutes which EPA implements, benefits to society of reducing exposures to lead will be weighed against the costs of achieving those reductions before taking action.

OBJECTIVES

To achieve this broad goal, EPA has set two objectives as a means of setting program priorities and gauging success. These objectives will necessarily evolve over time as we better understand the risk posed by lead exposure. These program goals include:

1. Significantly reduce the incidence of blood lead levels (PbB) above 10 µg/dl (subject to revision in light of the forthcoming CDC report) in children, while taking into account the associated costs and benefits.

This objective places EPA's priority on the highest exposures and on the most sensitive population, the 15 percent of U.S. children estimated to be at higher blood lead levels. This target is consistent with the recommendation of EPA's Clean Air Science Advisory Committee (CASAC) and the anticipated guidelines of the Centers for Disease Control (CDC). Among these children at risk, EPA will continue to work in close coordination with CDC efforts to identify, through additional surveillance programs, individual children with PbB above 25 µg/dl. These children should have their sources of lead exposure abated on a priority basis. All of the various initiatives will take into account costs and benefits to the extent allowed by statute.

2. Significantly reduce, through voluntary and regulatory actions, unacceptable lead exposures that are anticipated to pose risks to children, the general population, or the environment.

Under this objective, priority attention will be given to voluntary and regulatory actions, including pollution prevention activities, to reduce risks. This includes reducing or eliminating lead uses which may pose risks, encouraging environmentally sound recycling, and end-of-pipe controls. Any regulatory actions that will be taken under existing statutory authorities will generally be subject to a balancing of benefits and costs.

MAJOR ACTION ELEMENTS

To achieve the above objectives, EPA activities will proceed along several basic lines of action:

Develop Methods to Identify Geographic "Hot Spots": Identifying specific high exposure areas is critical to encouraging and directing the actual abatement actions. A major element of the lead strategy is to develop technical methods to assist other Federal agencies, and State and local governments, as they locate and map the regions, cities, neighborhoods and homes with high lead concentrations or EBL's. EPA will work with these other agencies to develop methods to identify high exposure localities and situations. For example, EPA will work with CDC's expanded blood screening programs to help identify types of exposure contributing to high blood lead levels in children. Another example of such a program is the Lead Education/Abatement Program, which is being implemented in EPA's Region 5. Data from a number of sources (covering a range of pathways and media) will be mapped into a geographic information system (GIS). Together with demographic information, this will be used to determine geographic areas with the highest at-risk populations so that education, prevention, and abatement efforts can be concentrated.

Develop and Transfer Abatement Technology: Developing and disseminating cost-effective methods and tools to abate "in-place" lead exposure sources is crucial to ensure the use of safe, effective and cost-efficient methods. This is important because (1) significant reductions in lead exposures usually entail abatement (including in-place management); and (2) most actual abatement operations will be conducted at the state and local level by property owners. EPA will develop and disseminate technical assistance to assist these efforts. Most of EPA's present efforts in this area address the abatement of lead-based paint. This includes the development of model training materials and the establishment of university-based training centers for the dissemination of materials, as well as providing funds to labor organizations to encourage proper training. Many other efforts are listed in the section of the strategy discussing abatement activities. As an example, EPA is coordinating with the National Institute for Standards and Technology to develop protocols to evaluate lead-based paint home/field test kits,

including performance criteria. The ease of following directions, and the ruggedness of the test procedure to departures from instructions, is also being evaluated for commercially available test kits.

Implement Lead Pollution Prevention Program: While the major tasks in reducing risks from lead are to abate or control lead that is already deposited in the environment, the lead pollution prevention program will seek to reduce future exposures associated with the continued use of lead. This program will include:

- exploring market-based incentives to limit or eliminate lead use and exposure;
- using regulatory mechanisms (such as the Toxic Substances Control Act (TSCA)) to reduce the use of lead in current and future products where risks outweigh the benefits; and
- identifying and encouraging cleaner technologies for mining, smelting and processing lead.

In addition, the Administrator has stated a goal of reducing lead releases (along with releases of selected other chemicals) by one-third by October 1992, using voluntary means; and reducing lead releases by 50% by 1995. The Administrator intends that this goal be reached primarily through pollution prevention, using toxics use reduction as the preferred approach. This goal applies to reductions which go beyond any existing regulatory requirements.

Minimize Human and Environmental Exposures through Traditional Control Mechanisms: This activity includes controlling lead contamination in water, air, and other media by setting performance standards and other regulatory approaches. Because lead presents risks through a wide range of media, the Agency has clustered together the current and prospective rules and policies addressing risks from lead from these various media. This will allow the Agency and the public to review the regulatory programs of each of EPA's program offices as a cohesive whole, and will help prevent the human and environmental risks of lead pollution from being simply transferred from one medium to another.

Encourage the Availability of Environmentally Sound Recycling: This activity is unique in that it highlights the inherent conflicts which are possible as individual offices strive to minimize lead emissions to their particular media. In order to reduce risks to populations and ecosystems from lead, and to provide safe disposition of spent lead products, the Agency seeks to encourage environmentally sound recycling capacity. Activities recently completed or under consideration by a number

of offices (see following sections) may have a significant impact on recycling capacity. For this reason, these activities will be coordinated and sequenced in order to achieve significant reductions in human and environmental exposure.

Develop and Implement a Public Information and Education Program: Informing and educating the public about sources of lead exposure, how to reduce or avoid exposure, and approaches to preventing additional lead from being introduced into the environment are essential to the success of EPA's lead strategy. This includes outreach to the public, industry, retailers, recyclers, labor, environmentalists, states, and the press. Public information and education tools may include guidance documents and brochures, specialized seminars and conferences, speeches, and videos, as well as media-directed activities such as press releases and press conferences. For example, EPA will produce a training video to assist schools in monitoring for lead in drinking water, and will also publish lists of water coolers containing lead and of certified analytical laboratories. EPA is also preparing a strategy to inform the public on the health risks associated with lead-based paint exposure, and has funded development of a community-based primary prevention program.

Integrate Enforcement: EPA is initiating a cross-media lead enforcement initiative, which will include coordinated inspections and analysis of data, and culminating in a nationwide filing of enforcement cases. This effort will highlight the Agency's commitment to improving compliance with regulations affecting major sources of lead emissions, as well as dealing with lead issues in general.

Coordinate Research Programs: A wide range of research is needed to assist in achieving the goals of this strategy. Some of these research needs are specific to a particular program office, while others are more general in scope. EPA intends to review, coordinate, and prioritize these research needs so that the Agency's research agenda is directly supportive of the program offices' most critical needs. The result of this effort, which will be managed through the Lead Research Sub-Committee, will be a ranking of research needs across the Agency, agreed to by each program office, which will then be used to help set the research agenda for coming years.

COORDINATION

In pursuing these objectives, risk reduction and research efforts will be integrated across program offices and environmental media. EPA will also coordinate its work with that of CDC, HUD, CPSC, OSHA, and NIST. This effort is particularly important since lead is a ubiquitous pollutant (in many areas, EBL's are attributable to more than one route of exposure), and since the impending regulations to deal with these exposures are

highly interdependent. The EPA Office Director Lead Committee (ODLC) is responsible for ensuring this coordination. The ODLC will monitor and report on lead-related activities to the Deputy Administrator on a continuing basis.

Specific Agency lead-related activities recently completed, underway or planned are described in the following sections. This document summarizes EPA's strategy for addressing lead exposures as envisioned by the Agency at the time of its publication. However, EPA's plans will be dynamic and evolving, and will be subject to change as new research and our ongoing programs indicate new priorities. Nevertheless, this strategy is meant to convey the Agency's deep concern about lead exposure, and its commitment to reducing associated risks to human health and the environment in the most efficient and cost-effective ways possible.

RESEARCH PROGRAM

Background

A focused research program is critical not only to develop sound regulations, but also to inform other Federal agencies and State and local governments on matters relating to abatement.

EPA will, in conjunction with CDC, HUD, and the Department of Commerce (through NIST), define, encourage and conduct the research needed by all governmental entities to (1) locate and assess, in terms of both geography and media, the most serious lead risks; and (2) develop methods and tools to cost-effectively reduce those risks. In this way, EPA can act as both a catalyst and an information resource to local abatement efforts.

Needs

While the toxicity of lead is well recognized, the biochemical mechanisms mediating its toxicity are unclear. Additional information is needed on certain aspects of exposure, including location, intensity, extent, accessibility, and bioavailability. In particular, the following efforts are needed:

- development of methods for identifying and mapping specific localities, neighborhoods and homes with high lead exposures from paint, soil, water and other sources (geographic "hot spots");
- determination of the relative contributions of these sources and pathways to EBL and environmental lead loading;
- development and evaluation of cost-effective abatement tools and methods;
- identification and evaluation of cleaner technologies for mining, smelting, processing and disposing of lead.

These research needs will be mentioned again as appropriate in the discussions of the various lead exposure pathways.

Planned/Recommended Actions

The Office Director's Lead Committee (ODLC) will establish an inter-office Lead Research Sub-Committee, with representation from the Office of Research and Development (ORD), the Office of Policy, Planning, and Evaluation (OPPE), and the program offices, to define and rank EPA lead research program objectives and activities. Particular emphasis will be placed upon efforts

likely to effectively address major sources of elevated blood lead levels.

The Lead Research Sub-Committee will report back to the ODLC at least annually, with a ranked list of research objectives. Upon concurrence, the ODLC will include this list in their periodic reports to the Deputy Administrator.

EPA's research program will also be coordinated with the research activities of other government entities, including CDC and HUD, through periodic meetings. Development of the methods for identifying and mapping geographic "hot spots", for example, must involve CDC, HUD, public drinking water suppliers, and State and local governments.

ABATEMENT PROGRAM FOR "IN-PLACE" LEAD

LBP EXPOSURES

Background

LBP is the most serious source of children's exposure. The ATSDR estimates that 12 million children are exposed to lead-painted homes, and that almost six million are exposed to the highest concentrations, in homes built before 1940.

In 1971, under the Lead-Based Paint Poisoning Prevention Act (LBPPPA), HUD began restricting FHA mortgages for new dwellings to those with paint that did not contain more than one percent lead. In 1973, amendments to the LBPPPA reduced this level to 0.5 percent, and designated HUD as the principal Federal agency to eliminate the hazard of LBP in housing.

In 1987, Congress enacted the Housing and Community Development Act, which among other things required HUD to prepare plans for the abatement of lead-based paint hazards in housing. A plan, Comprehensive and Workable Plan for the Abatement of Lead-Based Paint in Privately Owned Housing, was released in December 1990. Another plan addressing lead-based paint abatement in public housing is scheduled for completion by late 1991.

In 1988, Congress directed EPA and HUD to effect a Memorandum of Understanding (MOU), under which EPA would provide technical and program development support to HUD. EPA and HUD signed the MOU in April of 1989, identifying the following areas of technical and managerial assistance:

- accreditation of abatement personnel,
- establishment of training and information centers,
- intergovernmental relations,
- identification of gaps in existing technical standards,
- new technical standard-setting, and
- public outreach and education.

EPA's current work is in two major areas:

- assistance in developing technical information necessary to effectively administer abatement programs, and
- program assistance to help HUD and public housing personnel administer the program, and ensure that contractor/designer personnel do their work well.

CDC has historically directed the targeted lead screening program that identified lead-poisoned children, and has long

advocated intervention to lower EBL in children resulting from LBP. Recently, the Assistant Secretary for Health asked CDC to design a program to eliminate the childhood lead problem, including abating lead paint in deteriorated housing. EPA provided assistance to CDC in performing a detailed cost/benefit analysis of the program. CDC is expected to further lower the PbB level of concern from 25 µg/dl, significantly increasing the number of children above the action level.

Other agencies also play a role in LBP abatement-related programs. In 1978, the CPSC limited all residential paint to 0.06 percent lead. OSHA is actively pursuing a reassessment of the worker protection issue. NIST is currently under contract to HUD on a number of research issues related to measurement techniques and procedures for lead in paint-films and dust.

LBP accounts for the largest single share of EBL. The LBP problem is both large and complex; the magnitude of these exposures adds to the difficulty and expense involved in finding and implementing solutions. This is exacerbated because, while EPA and other Federal agencies can plan and otherwise assist activities, these agencies are not equipped to perform most actual abatement work. This field work will likely be performed by property owners under State and local government programs.

Needs

It is essential to achieving the first of this strategy's objectives that exposure to LBP be significantly reduced. There is a clear need to coordinate the various strategic plans that EPA, HUD and CDC are developing for dealing with LBP. State and local governments must also become involved. Given the magnitude of the problem, these jurisdictions will work with property owners who will conduct most of the actual abatement work.

Guidance is needed on acceptable lead levels in dust resulting from LBP to enable programs to set goals to reduce these exposures. The relative contribution to dust from LBP and soil needs to be established; and improved measurement methods for soil, paint and dust need to be developed to reduce abatement costs. More cost-effective LBP abatement and management approaches have to be developed.

Responsibilities fall into three broad categories: direct abatement; technical support and research; and operational support. Abatement involves planning and implementing abatement projects; technical support and research involves providing consultation and information; and operational support involves managing the infrastructure needed to support abatement programs. Examples of the third category include PbB screening, training and lab accreditation programs.

Planned/Recommended Actions

HUD will maintain responsibility for abatement programs as stipulated in the LBPPPA, and State and local governments should maintain or assume responsibility for abatement operations. The infrastructure programs will be handled by either HUD or associated agencies. In some cases (e.g., lab accreditation programs and development of standard reference materials), these may continue to be performed by NIST under contract to HUD.

In EPA, both OTS and ORD will be involved in providing technical support to HUD. EPA will use its technical facilities and expertise to address research and technical questions on exposure and analytical methods. In its research and technical support functions, EPA will assist in establishing support programs, but the operation of these programs should reside more closely to ongoing abatement efforts.

A Lead-based Paint Task Force, made up of EPA, HUD, CDC, NIST, and other Federal agencies, has been resolving these important research areas by identifying and developing initiatives to reduce exposures to in-place lead. A supplemental Congressional appropriation provided resources for these initiatives.

EPA will continue to pursue integrated strategic planning with both CDC and HUD. EPA will continue to provide technical support to HUD, and will coordinate closely with NIST and other agencies. CDC will play a similar role with respect to medical issues.

EPA's Office of Toxic Substances and Office of Research and Development, along with HUD, CDC, OSHA, CPSC, and NIST, have met with lead industry representatives, and these meetings may lead to a joint industry-Government research program in the area of LBP testing and abatement.

OTS is currently pursuing the following specific initiatives:

- Completion of model curricula for three role-specific training courses (for inspectors, abatement supervisors, and workers) in 1991. A course for abatement project designers will be developed by 1992.

- Establishment of one or two training centers, which will aid in the dissemination of training courses throughout the country. These will be established in 1991.

- Provide worker training grants to major groups after the model course materials are completed. This will be funded during late 1991.

- Initiate a flagship lead center at a leading university, to serve as a focal point for information transfer and to stimulate quality training by other organizations. This center will be established during FY 1991.

- Promote state lead training programs with seed grants to at least two states. It is expected that this program will be funded in late FY 1991.

- Develop a risk communication strategy to inform the public, industry, labor, environmentalists, etc. on health risks associated with LBP exposure. This will be prepared in 1991.

- Study of low-cost repair and maintenance activities (management in place). The pilot study will be completed in spring 1991; the study will continue through 1993.

- Study of the long-term effectiveness of abatement methodologies. A pilot study is expected to be completed in FY 1991; field work is expected to begin in FY 1991 and continue through FY 1993.

- Preparation of a Report to Congress on the applicability of RCRA to wastes generated from LBP abatement. This will be submitted to OMB in 1991.

- Continuation of support to HUD on the Guidelines for LBP abatement in public and Native American housing. This includes analysis of data collected by HUD in a national study and demonstration project. This will occur throughout 1991.

- Development of a test protocol to evaluate the effectiveness and durability of LBP encapsulants. This will be completed in 1991.

- Evaluation of LBP test kits for commercial and home use (with NIST and ORD), throughout 1991.

- Development of key components of a laboratory accreditation program (with NIST and ORD), including the development of protocols and standard reference materials for various analytical methods, throughout 1991.

- Development of a community-based primary prevention strategy/program for lead poisoning. This effort, to be accomplished through a grant to the Alliance to End Childhood Lead Poisoning, will result in a guide for local governments to develop multi-media primary prevention programs. This guide should be completed in 1992.

URBAN SOIL

Background

Lead-contaminated urban soil -- soil contaminated by (1) non-industrial sources of lead such as paint, gasoline and household wastes (e.g., used oil); and (2) industrial sources, (e.g., battery recycling sites, mining and milling sites, and smelters) -- might contribute together as much as 30 percent of exposures leading to EBL in children. Next to LBP, urban soil and dust are believed to be the most important source of lead exposure for children in many urban residential areas. There are perhaps 12 million children exposed to high soil lead levels. These exposures are often related to exposures from LBP -- with exterior paint breaking down to contaminate the soil, and the soil being tracked into residences.

Although EPA's Office of Emergency and Remedial Response (OERR) currently has a number of programs underway to address soil, the focus is primarily upon soil contaminated by industrial sources. An exception to this is OERR's Three City Study. Under Section 111(b)(6) of SARA, OERR, with advice from ORD, CDC, the Department of Agriculture (USDA) and others, is conducting a $15 million pilot program in Boston, Baltimore and Cincinnati to evaluate the impact of removal of lead-contaminated soil and dust on children's PbB.

Boston was selected in 1987, based on evidence of high soil lead attributable to paint, and high EBL's in children. Baltimore and Cincinnati were selected in 1988. The studies use widely available (low technology) means of removing lead-contaminated soil and dust.

The study has three components:

- pre-abatement monitoring for PbB and environmental lead (i.e., soil, dust, water, and paint);
- abatement of soil and dust contaminated with lead; and
- post-abatement monitoring.

All three cities have completed pre-abatement monitoring and are in the process of abatement. EPA will complete the study by the end of 1992.

Needs

Although believed to be one of the two most serious sources of lead exposure, far less is known about urban soil than about either paint or drinking water. Data are limited on the location and severity of the problem, on the extent to which abatement is required, and on the best procedures for achieving abatement. More information is needed to better characterize the problem, to determine pathways of exposure, and to determine effective remediation methods, as well as to developing methods to identify geographic "hot spots".

Planned/Recommended Actions

EPA's Office of Solid Waste and Emergency Response (OSWER) is responsible for actions involving lead abatement at NPL sites. Given the current lack of knowledge regarding urban soil, priority will be given to develop information about the problem and on methods of remediation. EPA will seek to establish a joint effort with HUD, CDC and ATSDR to promote and assist a national effort to identify the locations, extent, bioavailability and severity of lead-contaminated soil.

EPA's Region 5 has initiated a multi-year (1991 to 1993), $1.1 million project called the Lead Education/Abatement Program, or Project LEAP, to address exposures from contaminated soil and paint. This project, which is the result of an OPPE/Region 5 Comparative Risk Project, includes education, intervention, abatement of public and private areas, waste minimization, source controls, and pilot clean-up.

In 1991, Region 5 will develop a database of exposure (various media and pathways) to be used in a geographic information system application. They will then map the data and prioritize geographic areas on which to concentrate efforts (education, pollution prevention, and abatement activities). The Region will also initiate pollution prevention discussions with air sources of Pb. They will coordinate the development of education and training activities with OTS, and request assistance from the States in the Region. Finally, they will determine the compliance status of major sources of Pb, and initiate enforcement action as appropriate.

Region 5 will refine and update the exposure database in 1992. They will also initiate pollution prevention discussions with sources of Pb in targeted areas, with the goal of achieving even greater multi-media reductions in Pb releases than included in EPA's Industrial Toxics Program. They will begin implementation of the education program (developing and distributing brochures, stickers, coloring books, etc.), and will begin intervention efforts (distribution of calcium supplements, etc.). Finally, they will perform an abatement pilot project in

a worst-case city, including abatement of soil, dust, and paint. This will be expanded to six areas or communities in 1993.

The interim and final results of this program will be extremely useful to other Regions. OTS and OERR will assist Region 5 to ensure that plans, progress, and results are communicated.

SUPERFUND SITES

In 1988, ATSDR published its report on lead poisoning in children, as required by SARA §118(f). In June 1990, ATSDR published a toxicological profile for lead, as directed by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §104(i)(2).

More than 400 NPL sites have lead designated as a major contaminant or as a contaminant of concern in one or more media. These may include battery manufacturing or recycling sites, and mining and milling sites. The mining and milling sites, or residuals left by these activities, can involve large volumes and surface area, and can affect children, adjacent residents, and workers. The extent to which this contamination has contributed to EBL in the surrounding populations is unknown. PbB levels are not routinely measured at Superfund sites.

Soil lead levels are routinely measured at Superfund sites. At some mining sites, these levels have exceeded 10,000 ppm lead. OERR issued interim guidance last year indicating that lead soil levels at Superfund sites should be cleaned up to levels of 500 to 1000 ppm.

OSWER is working with ORD to provide methods for determining site-specific soil lead standards. One of the methods being developed is a biokinetic uptake model for lead.

In June 1990, OERR recommended a cleanup level of 15 ppb for lead in groundwater near Superfund sites if that water is usable for drinking water. This cleanup level, to be used until the lead drinking water standard is promulgated, is based upon analyses generated by the Office of Drinking Water (ODW) in developing the drinking water regulations using a 10 µg/dl PbB criterion.

Finally, an adjusted reportable quantity for lead will be completed. This will extend CERCLA §102(b) requirements for notification of release of hazardous substances to lead.

REGULATORY AND POLLUTION PREVENTION PROGRAM

EBL today is largely due to exposures to "in-place" lead previously deposited. Therefore, the highest public health priority is to abate exposures to this "in-place" lead -- with particular emphasis on LBP and lead-contaminated urban soil.

There are, however, some continuing sources of new lead -- particularly lead smelters and drinking water -- that warrant attention by EPA. These exposures, in contrast to those from "in-place" lead, are amenable to regulatory control. While EPA has limited regulatory authority to address "in-place" lead, it has ample authority under several statutes to restrict current and future consumption of lead which might add to new exposures. This may include both traditional emission control restrictions as well as pollution prevention measures that could, for example, result in the use of new smelting technologies to reduce the amount of lead waste generated. In addition, EPA may encourage pollution prevention measures to reduce the amount of lead in products.

This section summarizes the roles of the various EPA Offices in controlling new or ongoing lead pollution. All of these activities are under consideration, but a final decision has yet to be made regarding some of them. It is important to note that the activities summarized here, while significant and important in reducing lead contamination for specific localized populations as well as ecosystems, are not sufficient in themselves to adequately achieve the goal of significantly reducing the blood lead levels of children at highest risk. Achieving this objective is dependent upon significantly reducing risks due to LBP and urban soil.

OFFICE OF DRINKING WATER (ODW)

Background

Lead occurs in drinking water primarily due to corrosion of lead-bearing materials in water supply distribution systems (e.g., service lines, goosenecks, water meters) and in household plumbing (e.g., lead-soldered copper pipes, brass faucets, and brass fixtures). The highest levels are found in areas with corrosive waters, especially in older urban areas with lead service lines and mains, in homes with newly-installed lead solder (though now illegal) and brass faucets, and in buildings with drinking water coolers containing lead-lined tanks. Nearly everyone is exposed to lead in drinking water at some level. Concentrations vary widely from city to city, house to house, and even at the same tap depending on standing time of the water and temperature. There are very few data to make reliable nationwide

projections of current exposure. In 1986, EPA estimated that approximately 20 percent of the population was exposed to lead levels over 20 ppb in first-flush water. These data are being used to estimate baseline risks as part of the current reviews of the drinking water regulation and the lead National Ambient Air-Quality Standard (NAAQS).

Assuming the highest PbB to water lead relationships available in the literature, steady exposure to 20 ppb in drinking water would contribute between 2.5-3.5 µg/dl to a child's PbB. Most people are probably exposed to lower levels of lead in drinking water, and only a small fraction is exposed to much higher levels. Therefore, drinking water actually contributes a smaller amount for most of the population. On average, this is estimated at between one and two µg/dl.

EPA currently estimates that among U.S. children not living in deteriorating lead-painted housing, and not exposed to highly contaminated soils, approximately 3.5 percent have PbB above 10 µg/dl. Even if lead in drinking water could be completely eliminated, the percentage of children with PbB above 10 µg/dl would be reduced to 1.4 percent, although this shift would be relatively small -- from about 11 to 9 µg/dl on average.

Final Drinking Water Regulations

In 1988, EPA proposed revisions to the National Primary Drinking Water Regulation for lead under the SDWA. The major provisions of the proposal were for water suppliers to monitor lead levels in first-flush, standing water in high-risk homes, and to install and improve corrosion control and conduct public education if lead levels were above various targets. The current standard is a Maximum Contaminant Level (MCL) of 50 ppb measured at free-flowing taps located throughout the distribution system. The Agency is considering reducing this 50 ppb MCL to a 15 ppb first flush "Action Level" at the tap. The Agency is also considering requiring corrosion control, public education, source water monitoring and possible treatment, and lead service line replacement if the 15 ppb "Action Level" is exceeded in more than 10% of samples from high-risk homes (90th percentile). Further, EPA is considering whether to require all large systems (those serving more than 50,000 people) to optimize corrosion control for lead without jeopardizing overall water quality. ODW plans to promulgate the rule in April 1991.

ODW estimates that the final rule will result in the average PbB among children not exposed to paint or soil contamination hazards dropping from 5.3 to approximately 4.7 µg/dl. EPA estimates that actions by water systems to comply with the revised rule will reduce exposures for millions of Americans. Approximately half a million children will have their blood lead levels reduced to below 10 µg/dl. Although the average shift

will be relatively small, some children will have very significant decreases in blood lead.

Implementation

The SDWA requires drinking water regulations to be technologically and economically feasible. While corrosion control and lead service line replacement meet those criteria, it is difficult to predict the precise effectiveness of these treatments in reducing lead levels at household taps. ODW estimates that even after corrosion control, at least 17,000 of the 66,000 public water systems would exceed a 90th percentile level of 15 ppb.

In the final regulation, the Agency is considering whether to account for the limits of available technology by: 1) allowing systems that fail the target tap lead level to be considered in compliance if they demonstrate they have taken reasonable actions to minimize lead levels from sources under their control (e.g., corrosion control, source water treatment if required by States, and possible lead service line replacement); and 2) requiring systems that exceed the target tap lead level to regularly inform customers of easy ways that exposures from household plumbing can be minimized (e.g., not drinking first flush water after long standing times, checking for lead solder and pipes). ODW conducted a pilot public education program in Raleigh, North Carolina, that resulted in behavior changes to reduce lead exposures. Materials developed from this pilot study will be applied in the final rulemaking. ODW is developing brochures and other communication materials for use by water suppliers.

Finally, ODW will use university-based centers to train water suppliers, engineers, and regulators on practical ways to minimize water corrosivity and reduce lead levels in drinking water. This effort is being conducted in cooperation with national corrosion control experts and large metropolitan water suppliers.

Planned Actions

Several ongoing efforts should significantly reduce exposures to lead in drinking water. The 1986 Amendments to the SDWA banned the use of lead solder from public water supply systems, and from plumbing in residential or non-residential facilities connected to a public water system. The use of pipes or faucets containing more than eight percent lead was also banned. Given that much of the lead contamination comes from water standing in faucets and in interior plumbing, effective implementation of this ban is a high ODW priority. Although States have authority to enforce the ban, ODW has used a combination of regulatory and non-regulatory strategies to assist States and localities, including guidance and training for

Regions and States, an aggressive outreach program to educate consumers, and technical assistance to manufacturers of plumbing fixtures. OTS, in conjunction with ODW and industry, is considering using TSCA §6(a) to ban the sale of lead solder to plumbers and plumbing supply houses, to further ensure compliance.

The Lead Contamination Control Act (LCCA) of 1988 mandated recall of drinking water coolers with lead-lined water reservoir tanks, and banned the manufacture or sale of drinking water coolers with lead parts. ODW has developed a program to help schools correct lead contamination problems. This includes (1) distributing a guidance document and testing protocol to monitor for and remedy excessive lead levels in drinking water; (2) conducting training on how to follow the necessary procedures; (3) producing a training video; (4) publishing lists of brands and models of water coolers containing lead; and (5) publishing names of certified analytical laboratories.

ODW has also established a Safe Drinking Water Hotline to provide information on the LCCA, the lead ban, and other aspects of lead in drinking water.

OFFICE OF SOLID WASTE (OSW)

Resource Conservation and Recovery Act (RCRA)

Land Ban

In response to the 1984 Hazardous and Solid Waste Amendments to RCRA, OSW promulgated the "Third third" rule in June 1990. This rule specifies treatment standards (Best Demonstrated Available Technology, or BDAT) for hazardous wastes exhibiting the toxicity characteristic for lead, destined for land disposal. Earlier land ban regulations have also established treatment standards for lead in listed wastes. Land disposal includes any placement of hazardous waste in a landfill, surface impoundment, wastepile, injection well, or other placement on the land. This rule may establish more stringent requirements on temporary storage of spent batteries pending recycling. While BDAT for batteries is recovery of the lead, OSW is debating whether certain storage areas for lead-containing products awaiting recycling are considered wastepiles. Under the land ban, wastes must meet a treatment standard before being placed in piles. OSW has granted a two-year capacity variance for these storage areas pending a final decision on this issue. A decision to treat smelter storage areas as wastepiles could contribute to a reduction in recycling capacity, if smelters choose to close rather than meet the new requirements.

Toxicity Characteristic Leaching Procedure (TCLP)

OSW published a final rule in March 1990, under Subtitle C of RCRA, replacing the Extraction Procedure (EP) leach test with the TCLP. Under the EP, if a waste was a solid, homogeneous material, a sample of the waste could be tested using the structural integrity procedure (SIP), and did not have to be ground to pass through a 9.5 mm sieve the way all other wastes did. The TCLP no longer allows the use of the SIP for any wastes, although alternatives to the grinding requirement are being evaluated.

In addition, the final rule has a regulatory limit of 5 ppm for lead in the TCLP leachate, based on the current drinking water standard of 50 ppb. OSW will evaluate whether to change the regulatory limit once the revised drinking water standard, currently under development, is promulgated.

Both of these actions could cause additional secondary smelter slag to be considered hazardous waste, although other modifications to the standard setting procedure under consideration could offset the effect of the revised drinking water standard.

If additional slag is therefore characterized as hazardous waste, more secondary smelters will be required to comply with Subtitle C requirements. If, for example, a smelter is disposing of hazardous slag at its own on-site landfill, the smelter will have to comply with Subtitle C hazardous waste management requirements, including corrective action for all solid waste management units at the facility. These costs may cause some secondary smelters to choose to close.

Regulatory Determination on Mineral Processing Wastes

Lead slag from primary lead smelting is one of twenty mineral processing wastes currently excluded from regulation under RCRA Subtitle C. OSW is currently evaluating whether any of these twenty wastes should be regulated under Subtitle C, which would include permitting, manifesting, and on-site and off-site waste management activities. Subtitle C regulation may be warranted for lead slag because of its toxicity, documentation of damages, and widespread distribution of waste off-site. However, Subtitle C regulation could also contribute to economic disruption of the primary smelting industry; this is discussed further under the "Battery Cluster" section of this document. OSW plans to make its Regulatory Determination by June 1991.

Source Separation

OSW is considering issuing an Advance Notice of Proposed Rulemaking (ANPR) to solicit comments on a number of options to

encourage recycling. OSW is also studying current State battery recycling programs, and will develop and distribute information on the proper implementation of cost-effective, environmentally sound lead-acid battery recycling.

OFFICE OF TOXIC SUBSTANCES (OTS)

Toxic Substances Control Act (TSCA)

TSCA Lead Pollution Prevention Plan

The use of lead in products presents two types of exposures:

- exposures that occur from specific lead products during or immediately following production or use; and
- potential exposures that might occur from any lead-bearing product at some time in the future after disposal.

OTS has two regulatory objectives with respect to each type of exposure if they present unreasonable risks. In the first instance, OTS intends to (1) prevent new uses of lead, and (2) limit or, if appropriate ban, current uses of lead, if they present an unreasonable risk of injury to human health or the environment due to exposures generated during production or use.

For the second type of exposure, OTS plans to (1) encourage environmentally sound recycling of essential products which contain lead as essential component (e.g., lead acid storage batteries), and (2) explore the desirability and feasibility of discouraging overall consumption of lead in general.

Traditional pollution control rules, as well as pollution prevention efforts to reduce the amount of lead generated (including economic incentive or market-based approaches) may be suitable ways of addressing these exposures. OTS will examine both benefits and costs of possible actions, including an analysis of materials which would be substituted for lead in specific products. OPPE is working closely with OTS to evaluate these alternative approaches.

Prevention of new uses of lead posing unreasonable risks

While new lead uses continue to be developed, they are not subject to EPA scrutiny prior to commercial production. OTS is considering rulemaking to require advance notice from anyone intending to manufacture or process lead for a new use, in order to ensure that these uses do not pose unreasonable risks. This would afford EPA an opportunity to review the intended new use and, where risks are unreasonable, to either limit or ban it.

Phase-out of current uses of lead posing unreasonable risks

Several uses of lead that generate risk during use may be candidates for bans or restrictions under several Federal statutory authorities. OTS will perform a regulatory investigation on these uses, considering the benefits of each product relative to the risks, in order to determine if the risk is "unreasonable" and should be regulated under TSCA. Uses currently under consideration for a ban or restriction under TSCA include:

- brass and bronze plumbing fittings and fixtures (scheduled proposal January 1992),
- lead solder used to join water pipes (scheduled proposal January 1992), and
- lead in non-residential paint.

This list may be expanded in the future.

Battery recycling

In 1989, 1,012,155 metric tons of lead, approximately 80 percent of total domestic consumption, went into batteries. Because of the amount of lead involved, EPA is considering a rule to increase and maintain the rate of battery recycling, in order to reduce risks due to lead discarded in the environment and to primary lead mined.

Somewhere between 80 to 95 percent of spent batteries are currently recycled; however, lead acid batteries still comprised 65% of all lead in municipal solid waste in 1988. In addition, if the price of lead again falls, the market may not support even the current recycling rate. OTS is considering a rule to encourage battery recycling in an environmentally sound manner, and to sustain high recycling rates through world market price fluctuations. This rule is scheduled to be proposed in October 1991. EPA is involved in a regulatory negotiation, scheduled to run through April 1991, to determine the best methods to encourage maximum recycling.

The regulatory negotiation is considering a variety of approaches, including requiring battery manufacturers to include some specified fraction of recycled lead in the total amount of lead they need to produce new batteries; require the battery distribution chain to accept any spent batteries returned for recycling; a combination of both approaches, or another mechanism. This rule is particularly amenable to a market-based approach using economic incentives, and this option is being jointly explored by OPPE and OTS.

Additional potential restrictions of lead

OTS plans to publish an ANPR in 1991 under TSCA which will begin the process of examining the feasibility and desirability of additional restrictions on lead. If OTS determines that the risks of lead use are unreasonable, this will be followed by a Notice of Proposed Rulemaking (NPR) with proposed regulatory remedies. A variety of TSCA §6(a) rules are possible, including rules that would restrict general consumption of lead or provide economic incentives for reducing lead use, based on a balancing of the benefits to society of such reductions against their associated costs.

Final risk management decisions regarding the entire TSCA lead regulatory program will be made after consideration of comments received on the ANPR, status of other rules, and evaluation of an economic incentives analysis.

OFFICE OF AIR QUALITY PLANNING AND STANDARDS (OAQPS)

Background

The current lead NAAQS was set in 1978 at 1.5 $\mu g/m^3$, quarterly average. EPA's primary mechanism for attaining the NAAQS has been the reduction of lead in gasoline. In addition, lead emissions from industrial sources have been substantially reduced by State Implementation Plans (SIP's) designed to attain the particulate matter and lead NAAQS. Further reductions have also resulted from the New Source Performance Standard (NSPS) for smelters. In combination, these control programs have resulted in major reductions in air lead and in children's PbB. Available data indicate that the lead NAAQS is being attained in all areas except those near lead smelters, refineries and remelters. In these areas, exposures are due both to current emissions and to resuspension of soil contaminated by past emissions. OAQPS has developed a compliance strategy to bring these areas into attainment.

Strategy for achieving attainment of the current lead NAAQS

Twenty-nine sources (four primary smelters, 23 secondary smelters, one lead refinery and one lead remelter) have been identified under OAR's attainment strategy. Monitoring data from the sources with monitors indicate that 10 of the 11 do not attain the current NAAQS. Fifteen other smelters had modelled violations.

Non-attainment is due either to non-compliance with SIP emission limits, or to insufficient SIP emission limits which would not result in attainment of the NAAQS even with full compliance. Bringing an area into attainment with the NAAQS

typically involves three steps: (a) monitoring air quality, (b) developing control plans (SIP requirements), and (c) enforcing those regulations. However, in developing SIP requirements, a series of estimates must be made to determine the emission reduction needed to attain the NAAQS. Because of uncertainties in such estimates, some areas might not attain the NAAQS even when all sources in the areas are in compliance with their SIP requirements. When this occurs, EPA can initiate a SIP revision.

Because the 42 facilities in the OAQPS Extended Exposure Analysis affect only their immediate vicinity, the number of children at risk is small compared to the number of children at risk from LBP, contaminated urban soil or drinking water. However, non-attainment of the NAAQS adds significantly to the PbB level of these children. OAQPS estimates that the number of children near these facilities with PbB greater than 10 µg/dl would be reduced about 50 percent, from approximately 800 to 400, if the current NAAQS was attained in all areas of the country.

OAQPS's lead NAAQS attainment strategy, approved by the Deputy Administrator, contains four activities:

1. Expand monitoring to all 29 large lead sources.

   An expanded ambient monitoring initiative is underway to provide the necessary ambient monitoring database near stationary lead sources. Ambient monitoring networks will be initiated near each of the sources, and initial ambient air data analyses should be complete by June 30, 1991.

2. Conduct Federal inspections of all 29 sources.

   As scheduled, the Regions completed inspections of each of the 29 sources by December 31, 1990. Approximately six of these sources were found to be in violation.

3. Implement "leveraged enforcement" by coordinating with other program offices (multi-media approach).

   OAQPS has asked the Regions to develop enforcement actions by January 31, 1991; negotiate multi-media consent agreements by October 30, 1991; and achieve emission reductions expeditiously thereafter.

4. Designate, or require States to designate, non-attainment areas with respect to the lead NAAQS, and to require SIP revisions for these areas.

   EPA began the designation process in October 1990. States must respond by February 1991, and designations will be final by June 1992. Revised SIP's will be due by the end of 1993, and attainment of the NAAQS is expected by mid-1997.

NAAQS review

The Clean Air Act (CAA) requires that EPA review the NAAQS every five years and make any appropriate revisions. The scientific and technical assessment portion of the lead NAAQS review was completed in January 1990, when the Clean Air Scientific Advisory Committee gave final closure on the lead Staff Paper and the supplement to the Addendum to the Criteria Document. CASAC concluded that: (a) EPA should set a NAAQS that minimizes the number of children with PbB greater than 10 μg/dl, (b) a NAAQS at the upper end of the range under consideration (1.0 to 1.5 $\mu g/m^3$) offers little if any margin of safety, and (c) populations not quantitatively analyzed in EPA exposure modelling should be considered for setting a margin of safety on the NAAQS. CASAC also asked EPA to examine a NAAQS of 0.25 $\mu g/m^3$, if only to provide perspective on the higher alternatives.

OAQPS has analyzed the effect of NAAQS revisions by reviewing 42 lead point sources -- the 29 sources identified for the NAAQS attainment strategy, and 13 other sources that are not currently being pursued under the attainment strategy, but which may be in non-attainment if the NAAQS is lowered. OAQPS has estimated the number of children living near these sources who would have PbB greater than 10 μg/dl at each of the alternative NAAQS levels, and at background air lead concentrations. Approximately 126,000 children live near these sources. The results shown on the following table should not be interpreted as the absolute number of children at risk of elevated PbB from point source emissions because (1) they are based on a sample of sources, and (2) they do not specifically reflect the exposure characteristics of children living in homes with deteriorating LBP or children with an unusually strong tendency to ingest non-food items. In addition, the results do not represent the risks faced by other sensitive groups such as pregnant women (for fetuses) and adult men. However, the results are useful for comparing the relative protection afforded by alternative standard levels.

Estimated Number of Children Exceeding 10 μg/dl PbB under Alternative NAAQS Situations

NAAQS alternatives	No. children with PbB higher than 10 μg/dl*
1.5 $\mu g/m^3$ quarterly, today	800
1.5 $\mu g/m^3$ quarterly, enforced	400
0.75 $\mu g/m^3$ monthly	200
0.25 $\mu g/m^3$ monthly	150
Background (0.10 $\mu g/m^3$)	150

(Assuming water level = 8 μg/l, constant soil level)
(* - rounded to the nearest 50)

As the table shows, enforcing the current NAAQS would provide a greater incremental public health benefit than any of the contemplated NAAQS revisions. Most of the public health improvements would be near primary and secondary smelters.

While cost and technological feasibility are not to be considered in setting NAAQS, impacts on both primary and secondary smelters have implications for the broader integrated lead strategy. If none of the operating primary smelters could attain the NAAQS level selected during the Agency's review with readily available control technologies, the domestic primary smelting industry may simply shut down. This could result in increased importation of primary lead from countries with less stringent standards. Should such smelters close, they could be potential Superfund sites due to past contamination. In addition, impacts on secondary smelter capacity have implications for EPA's efforts to promote environmentally sound battery recycling, and are discussed in the following section on that topic.

Secondary Smelter NSPS

As part of the lead Pollution Prevention Program, OAQPS is initiating work on a revised NSPS for secondary smelters to ensure that new or reconstructed secondary smelters continue to apply best demonstrated control technology. New sources also must demonstrate compliance with the lead NAAQS. The analysis for this revision will consider the feasibility of performance standards based on alternative smelting technologies that would reduce lead discharges to other media as well as air.

OFFICE OF PESTICIDE PROGRAMS (OPP)

The last known use of lead as a pesticide active ingredient (lead arsenate for use on grapefruit) was voluntarily cancelled in 1989, generally due to concerns about the arsenate. EPA is currently revoking the associated tolerance levels.

OPP found lead as an inert ingredient in 13 pesticide products. As a result of this discovery, OPP issued data call-in notices to all of the registrants of these products. Out of the 13 products, 11 have been cancelled, one has been reformulated without lead, and one is pending cancellation, since the registrant has not responded to OPP's request.

OPP believes these actions have removed lead from pesticide products. There is, however, one possible area for additional action, and that involves active ingredients registered before 1984. OPP is undertaking a review of pesticides registered prior to 1984, in order to discover if any contain lead as an active

ingredient. If OPP finds lead as an active ingredient, it will initiate appropriate regulatory action.

OFFICE OF WATER REGULATIONS AND STANDARDS (OWRS)

Clean Water Act

EPA estimates that sewage sludge contributes less than 0.05 percent to total high hazard lead exposures, and virtually all of this occurs with incineration of sludge.

Section §405(d) of the Clean Water Act (CWA) requires EPA to propose and promulgate regulations establishing numeric limits and management practices regarding sludge that are adequate to protect public health and the environment from any reasonably anticipated adverse effects of each pollutant. Currently, EPA (40 CFR Part 257) regulates the land disposal of sewage sludge from publicly and privately owned treatment works. EPA has also proposed a rule under the Resource Conservation and Recovery Act (RCRA) and the CWA which would establish standards for the co-disposal of sewage sludge in municipal solid waste landfills.

Because Part 257 covers only a limited number of pollutants and use and disposal practices (land application and landfilling), EPA is developing more comprehensive regulations under 40 CFR Parts 501 (issued in May 1989) and 503 (scheduled to be promulgated in January 1992). These regulations are expected to reduce the number of children with PbB over 10 µg/dl (as a result of exposure to sludge) by 360, from 414 to 54. Lead is only one of the contaminants covered by these regulations. OWRS is constructing the final Part 503 rule to establish reasonable worst case protective limits for lead-bearing sludge, to avoid treating it as a "special case" requiring extraordinary treatment. OWRS believes that there is minimal risk from lead in sludge applied to land, and that tight restrictions on land application of lead-bearing sludge could force transfer to incineration, where exposures and risks are significantly greater. Furthermore, stringent lead limitations may not reduce lead concentrations in sludge because sources may be beyond the control of the POTW.

OFFICE OF ENFORCEMENT (OE)

OE is working with the Regional Offices and Headquarters Program Offices to implement a lead enforcement initiative to improve compliance with existing regulations. This cross-media, pollutant specific initiative will be the first of its kind undertaken by the Agency. The initiative likely will include filings under at least the CAA, CWA and RCRA.

OE is assisting in coordinating inspections and analysis of data collected from major sources of lead emissions. One focus will be the use of the CAA to reduce air emissions of lead from primary and secondary lead smelters, with an emphasis on compliance with SIP lead emission limits. This is discussed further in the section on OAQPS activities. OE will also focus on violations of lead limits in NPDES permits for industrial and municipal wastewater discharges and pretreatment requirements for industrial users of municipal wastewater treatment systems. Some RCRA actions likely will be brought against primary and secondary lead smelters. Other offices are also exploring the possibility of developing lead cases in other media. A national filing of enforcement actions against sources of lead emissions is expected in early July 1991.

The publicity surrounding this effort will highlight the significance of this cluster filing and also to underscore the Agency's commitment to improving regulatory compliance and dealing with lead problems.

APPENDIX I
GLOSSARY OF ACRONYMS

ANPR	Advance Notice of Proposed Rulemaking
ATSDR	Agency for Toxic Substance and Disease Registry
CAA	Clean Air Act
CASAC	Clean Air Science Advisory Committee
CDC	Centers for Disease Control
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CPSC	Consumer Product Safety Commission
CWA	Clean Water Act
EBL	Elevated Blood Lead
HUD	Department of Housing and Urban Development
LBP	Lead-Based Paint
LBPPPA	Lead-Based Paint Poisoning Prevention Act
LCCA	Lead Contamination Control Act
LEAP	Lead Education/Abatement Program
MCL	Maximum Contaminant Level
NAAQS	National Ambient Air Quality Standard
NIST	National Institute of Standards and Technology
NPL	National Priority List
NPRM	Notice of Proposed Rulemaking
NSPS	New Source Performance Standard
OAQPS	Office of Air Quality Planning and Standards
ODLC	Office Directors Lead Committee
ODW	Office of Drinking Water
OE	Office of Enforcement
OERR	Office of Emergency and Remedial Response
OPP	Office of Pesticide Programs
OPPE	Office of Policy, Planning and Evaluation
ORD	Office of Research and Development
OSW	Office of Solid Waste
OSWER	Office of Solid Waste and Emergency Response
OTS	Office of Toxic Substances
OWRS	Office of Water Regulations and Standards
PbB	Blood Lead
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SIP	State Implementation Plan (OAQPS issues) or Structural Integrity Procedure (OSW issues)
SNUR	Significant New Use Rule
TCLP	Toxic Characteristic Leaching Procedure
TSCA	Toxic Substances Control Act
USDA	U.S. Department of Agriculture
µg/dl	Micrograms per Deciliter

APPENDIX II
CASE STUDY IN COORDINATION: THE BATTERY CLUSTER

Maintenance of environmentally-sound lead recycling capacity -- to prevent batteries from being discarded in the environment, to reduce the need to mine and smelt new lead, and to reduce lead concentrations near smelters to an acceptable level -- is an important part of this lead strategy. A number of regulations have been identified in this document which could affect the recycling of lead acid batteries.

The secondary smelting industry is essential to the continued availability of domestic battery recycling. The increased costs of pollution control associated with safe recycling could result in a significant part of this industry choosing to close rather than to install necessary equipment. Losses of this domestic recycling capacity could result in a net increase in risks to human health and the environment due to lead, because of the increased need to introduce primary lead into the domestic market, and other consequences based on the international market.

To avoid this outcome, the group of regulations affecting battery recycling (and smelter operation) were clustered so that they could be considered in a cohesive EPA plan to address lead exposures and encourage environmentally sound battery recycling.

Background

In 1989, approximately 80 percent of total domestic consumption of lead went into batteries. Although 80 to 95 percent of spent batteries are currently recycled, batteries still comprised 65 percent of all lead in municipal solid waste in 1988. EPA wants to encourage increases in the recycling rate. Further, the price of lead has fluctuated over time. If the price falls again, the market may not support even the current recycling rate.

Several regulations, policy determinations, and programs have been grouped together as the "Battery Cluster":

* Municipal Solid Waste Landfill Materials Separation ANPR (under consideration), possibly addressing batteries (OSW);

* Lead Acid Battery Recycling Proposed Rule, considering alternative battery recycling strategies (OTS);

* Proposed Revision of National Ambient Air Quality Standard (NAAQS) for lead, possibly requiring smelters

to meet more stringent air emission requirements (OAQPS);

* Proposed Revision to NSPS for Secondary Smelters (OAQPS);

* Regulatory Determination on Mineral Processing Wastes for Lead Slag, possibly requiring primary smelters to meet RCRA Subtitle C requirements (OSW);

* Land Disposal Restrictions ("Land Ban"): the "third-third" rule, including lead disposal and storage requirements for smelters (OSW - promulgated June 2, 1990);

* Revisions to Toxicity Characteristics for Hazardous Wastes (TCLP) (OSW - promulgated March 29, 1990); and

* Lead NAAQS Attainment Strategy/Smelter Compliance Plan, forcing smelters to meet lead air emission requirements of the current NAAQS (OAQPS - ongoing).

An ad hoc Task Force, chaired by OTS, assessed and made recommendations regarding the appropriate sequence and collective impact of the several impending decisions that could adversely affect secondary smelting capacity. The task force consists of a subset of offices which have been directly involved in development of this strategy. The workgroup developed a regulatory plan, described below, outlining their recommendations.

Effects of Regulations

Many of these programs could affect the economic viability of smelters. The Land Ban, the TCLP, and downward revision of the lead NAAQS are all factors which could reduce the profitability of secondary smelters, causing owners to close the facilities or cut back production. Even enforcing the existing NAAQS could affect existing recycling capacity. Secondary smelters, however, are also recyclers of batteries and other lead scrap -- a very important component of the lead strategy. In addition, due to the international nature of the smelting industry, there are a number of other potential consequences that must be considered, including a reduction in domestic lead production and increased foreign production.

The Agency is considering all of the various linkages among potential actions affecting battery recycling. The regulatory investigations now planned or underway may or may not result in rules, but EPA wants to be sure that it considers in advance the consequences of each possible rule on the others, and on the lead industry as a whole.

From the list of actions outlined above, several could have particularly important effects on the industry. For example, OAQPS analyses indicate that a revised NAAQS, if adopted, would have an impact on domestic secondary smelting, or recycling, capacity. A TSCA rule addressing battery recycling could provide an incentive to continue smelter operation. If the Agency were to pursue restrictions on battery disposal, that also may encourage recycling. Another important action under review is a Regulatory Determination that may require primary smelters to comply with RCRA Subtitle C for lead slag. If EPA decides Subtitle C is applicable, it could have significant effects on the economic viability of the domestic primary smelting industry. If less primary lead were available, recycling would become more economically viable.

Other policies and actions outside the Agency, such as some State requirements for battery recycling, could either promote or counteract the effects of actions EPA is investigating.

This cluster of recent and impending regulatory decisions -- if carefully considered and coupled with a pollution prevention policy -- could conceivably encourage the smelting industry to adopt new technologies that would provide more efficient and cost-effective means of complying with the set of regulations.

Description of Cluster Product

Agency offices are working on a consolidated plan which is designed to meet virtually all of the program-specific goals of each regulation to address lead releases into a particular medium and at the same time address the unacceptable risks from lead across Agency programs.

The rules and programs included in the Battery Cluster are listed above and are being coordinated among program offices. Coordinating the goals, programs, and schedules of the participating offices will (1) improve the potential effectiveness of individual programs by reinforcing their goals through language in rules developed by other offices, and (2) help achieve the Agency's goals in encouraging the continued availability of environmentally sound recycling capacity for lead acid batteries. Specifically, the following coordination will occur between program offices, and is an example of the type of coordination necessary when dealing with a ubiquitous pollutant. Obviously, plans and schedules for specific rules may change as the Agency analyzes regulatory alternatives and applicable costs and benefits.

There are several linkages that EPA has identified. For example, the third potential regulation on the list is the lead NAAQS revision. If EPA lowers the NAAQS for lead, the new standards will not be in place until well after decisions are

made on the other actions in the cluster. However, the proposal date of any NAAQS revision would signal the smelting industry that new controls will be needed. Lowering the NAAQS could therefore potentially have a significant adverse economic effect on primary and secondary smelters. While economic impacts are not considered in setting a NAAQS, it is in the Agency's overall interest to encourage continued smelting/recycling capacity. Therefore, if a lowered NAAQS were to be proposed, EPA would want to have finished its regulatory negotiation on recycling in time to propose any recycling rule concurrently. The goal would be to provide industry with greater certainty on investing in the pollution control technologies needed to meet the new standards and ensure safe recycling.

Implementation

Agency offices will continue coordination as each of the regulations in the cluster is developed. The preambles of each of the rules will cross-reference and reinforce the other rules in the cluster, and will also state that the rule is a part of a consolidated Agency action to reduce risks from lead.

The ODLC will identify emerging regulations and programs which may affect smelting or battery recycling, and also new issues affecting the rules already included in the cluster. Coordination will include consideration of effects both on the timing and substance of the other rules in the cluster.

As mentioned previously, the ODLC will report back to the Deputy Administrator periodically, on the battery cluster as well as on other issues included in this strategy document.