PUBLIC COMMENT DRAFT

EPA STRATEGY TO REDUCE LEAD EXPOSURES AND DISPARITIES IN U.S. COMMUNITIES

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DRAFT EPA Strategy to Reduce Lead Exposures and Disparities in U.S. Communities

EXECUTIVE SUMMARY

The EPA has developed this draft *Strategy to Reduce Lead Exposures and Disparities in U.S. Communities* (Lead Strategy) to lay out an all-of-EPA plan to strengthen public health protections and address legacy lead contamination for communities with the greatest exposures and promote environmental justice.

The EPA is seeking public comment on this draft strategy through a public docket on www.Regulations.gov, hosting listening sessions, and targeting outreach to communities that are disproportionately impacted by exposures to lead as well as other key stakeholder groups, including tribes, states, territories, local governments, non-governmental organizations, and industry. This draft Lead Strategy is focused on addressing lead exposures from lead-based paint, dust, soil, drinking water, and air. Following the public comment period, the EPA will revise, finalize, and implement the Lead Strategy. The final Lead Strategy will include a timeline of milestones as well as metrics for tracking and measuring the EPA's progress in meeting the actions described.

Very low levels of lead in children's blood have been linked to adverse effects on intellect, concentration, and academic achievement.[1] The United States has made substantial progress in reducing lead exposure, but significant disparities remain along racial, ethnic, and socioeconomic lines. For example, Black children and those from low-income households have persistently been found to have higher blood lead levels than non-Hispanic white children and those from higher income households.[2] Under this strategy, EPA will focus on eliminating the disparities in blood lead levels by taking targeted actions to prevent childhood exposures that could lead to lifelong health effects and barriers to social and economic well-being.

The Biden Administration and EPA Administrator Michael Regan are committed to addressing ongoing exposures to lead and the health impacts they cause to communities across the nation. The EPA developed the Lead Strategy to build on 40 years of progress in reducing lead in the environment and to focus attention on overburdened communities with environmental justice concerns, consistent with the *Executive Order on Advancing Equity and Support for Underserved Communities Through the Federal Government*.[3]

[1] NTP (2011) https://ntp.niehs.nih.gov/go/36443
[2] Egan et al. (2021) *Env. Health Pers.* https://doi.org/10.1289/EHP7932
[3] https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/

The EPA's Strategic Plan for Fiscal Years 2022-2026 commits the Agency to taking actions that minimize public health disparities.[4] The EPA's new Lead Strategy will help achieve that ambitious objective by addressing elevated blood lead levels in children from families living below the federal poverty level and other groups with higher lead exposures. To accomplish this objective the Lead Strategy sets out four key goals:

1) Reduce community exposures to lead sources
2) Identify communities with high lead exposures and improve their health outcomes
3) Communicate more effectively with stakeholders
4) Support and conduct critical research to inform efforts to reduce lead exposures and related health risks.

These four goals align with the goals in the *2018 Federal Action Plan to Reduce Childhood Lead Exposure,* which focused broadly on protecting children's environmental health.[5] The EPA's new Lead Strategy also seeks to protect children's health but with a particular emphasis on reducing lead exposure in communities with persistent disparities in children's blood lead levels and promote environmental justice.

The EPA has identified three new approaches that will guide EPA's actions and facilitate greater collaboration within the Agency and with federal partners:

APPROACH 1: Reduce lead exposures locally with a focus on communities with disparities and promote environmental justice

- The EPA will work with our partners to identify communities where lead exposure and blood lead levels are known or reasonably suspected to be highest and then determine the dominant sources and cumulative exposure pathways. The EPA will subsequently use this knowledge and evidence-based best practices to focus the Agency's actions under all applicable authorities to reduce risk.

APPROACH 2: Reduce lead exposures nationally through protective standards, analytical tools, and outreach

- The EPA will prevent and reduce lead exposures by developing and implementing national standards, policy, and guidance; enforcing regulations and statutory requirements; using analytical tools, conducting research, and applying evidence to improve the scientific foundations for methods to reduce and mitigate lead exposure; and soliciting stakeholder input to inform Agency decisions.

APPROACH 3: Reduce lead exposures with a "whole of EPA" and "whole of government" approach

- The EPA will target opportunities to collaborate across EPA programs and with federal partners and other governmental stakeholders, including states, tribes, cities, and

[4] The EPA FY22-26 Strategic Plan remains a draft until February 2022, following public review.
[5] https://www.epa.gov/sites/default/files/2018-12/documents/fedactionplan_lead_final.pdf

counties, as well as non-governmental organizations and industry stakeholders, to focus the full range of resources to reduce lead exposures from all sources in the most impacted communities across the country. The Agency will use evidence-based strategies for communication and outreach designed to reduce these exposures.

These approaches, and the actions EPA will take to achieve them, recognize that despite great progress over the past few decades to address lead exposure, EPA still has important work to do, especially in communities already burdened by pollution and other health and social stressors. Exposure sources and pathways for lead are complex and numerous, including lead-based paint, house dust, drinking water, soil, and air. Health risks are especially significant to young children when exposed directly, or indirectly from nursing mothers, or in utero. Working locally, nationally, and with a whole of government approach, EPA is determined to take ambitious actions that follow the science, are transparent, and advance justice and equity to rid communities of harmful lead exposure and resulting toxic effects.

INTRODUCTION

The EPA's Strategic Plan for Fiscal Years 2022-2026 commits the Agency to taking actions that minimize public health disparities.[6] The EPA's new Lead Strategy will help achieve that ambitious objective by addressing elevated blood lead levels in children from families living below the federal poverty level and other groups with lead exposures. This draft Lead Strategy provides a framework to help achieve this goal and emphasizes the need to address racial, ethnic, and socioeconomic disparities from all sources of lead exposure. Under this Lead Strategy, EPA will consider and implement recommendations from federal and state advisory committees for reducing lead exposures in communities with environmental justice concerns and in collaboration with our federal, state, tribal, and local government partners.[7] As EPA advances this Lead Strategy, it will rely on scientific research and evidence as the basis for decision making to mitigate lead exposure from all environmental sources of lead.[8] For example, we will continue advancing and applying science for children's blood lead modeling and exposure mapping, for contaminated soils remediation, and location of drinking water lead service lines.

Regulatory actions by EPA and other federal agencies have eliminated the use of lead in automotive gasoline, paint, food containers, and new water system components in the past 40 years. Despite significant progress in reducing lead exposures, EPA needs to continue its work to equally protect people of all races, ethnic groups, income levels, disabilities, and life stages, including young children and pregnant women, who are the most vulnerable to the toxic effects of lead. Children living in communities overburdened by pollution and other health and social

[6] The EPA FY22-26 Strategic Plan remains a draft until February 2022, following public review.

[7] Indiana Advisory Committee to the U.S. Commission on Civil Rights (2020)

[8] Foundations of Evidence-Based Policymaking Act of 2018: https://www.epa.gov/data/foundations-evidence-based-policymaking-act-2018

stressors, which are often communities of color and lower socioeconomic status, are at greater risk. For example, lead-based paint, lead service lines, and plumbing fixtures containing lead are more likely to be found in older houses in lower-income areas. Communities of color can also face greater risk due to redlining, historic racial segregation in housing, and reduced access to environmentally safe and affordable housing.[9] Industrial sources of lead are more likely to be closer to lower income neighborhoods and communities of color where soils in residential and public places can be contaminated.[10]

Children are generally more susceptible than adults to an array of adverse health effects associated with lead exposures, but lead presents a health risk across the lifespan. Some subpopulations, including pregnant and nursing women, can have an increased health risk. Fetuses can be exposed through the placenta, and infants can be exposed through breast milk and formula made with lead-contaminated water. Children can be exposed through "take home" exposures, like lead in dust, from their care givers and other people. Even very low levels of lead in children's blood have been linked to adverse effects on intellect, concentration, and academic achievement. These effects have lifelong impacts on an exposed individual's quality of life. Additionally, early life exposures lead to later-in-life health impacts including high blood pressure, heart and kidney disease, and reduced fertility.

Numerous and disparate sources of lead, coupled with many federal, local, and state agencies having separate legal authorities to address those sources, create a challenging landscape for tackling the problem. The EPA and its other federal partners need to find new approaches to protect communities still experiencing the highest childhood blood lead levels by reducing children's exposures to lead sources. The EPA's Lead Strategy focuses our efforts to reduce elevated blood lead in communities by addressing multi-media exposure pathways with all our applicable statutory authorities, across all our relevant programs, and in coordination with our federal partners and stakeholders.

LEAD STRATEGY APPROACHES

The EPA's Lead Strategy includes three key approaches for all the goals and objectives that will drive how and where the Agency will accelerate efforts to reduce lead exposures and eliminate racial and socioeconomic disparities in blood lead levels in communities across the United States:

APPROACH 1: Reduce lead exposures locally with a focus on communities with disparities and promote environmental justice

[9] Robert J. Sampson, The Racial Ecology of Lead Poisoning: https://scholar.harvard.edu/files/alixwinter/files/sampson_winter_2016.pdf
[10] Centers for Disease Control and Prevention, Populations at Higher Risk: https://www.cdc.gov/nceh/lead/prevention/populations.htm

The EPA will work with our partners to identify communities where lead exposure and blood lead levels are known or reasonably suspected to be highest and then determine the dominant sources and cumulative exposure pathways. The EPA will subsequently use this knowledge and evidence-based best practices to focus the Agency's actions under all applicable authorities to reduce risk.

APPROACH 2: Reduce lead exposures nationally through updated protective standards, analytical tools, and outreach

The EPA will prevent and reduce lead exposures by developing and implementing national standards, policy, and guidance; enforcing regulations and statutory requirements; using analytical tools, conducting research, and applying evidence to improve the scientific foundations for methods to reduce and mitigate lead exposure; and soliciting stakeholder input to inform Agency decisions.

APPROACH 3: Reduce lead exposures with a "whole of EPA" and "whole of government" approach

The EPA will target opportunities to collaborate across the EPA programs and with federal partners and other governmental stakeholders, including states, tribes, cities, and counties, as well as non-governmental organizations and industry stakeholders, to focus the full range of resources to reduce lead exposures from all sources in the most vulnerable communities across the country. The Agency will use evidence-based strategies for communication and outreach designed to reduce these exposures.

LEAD STRATEGY STRUCTURE

The EPA's Lead Strategy centers around four key goals that align with the goals and objectives developed in the 2018 *Federal Action Plan to Reduce Childhood Lead Exposure* (Federal Lead Action Plan) produced by 17 federal agencies, including EPA, serving on the President's Task Force on Environmental Health Risks and Safety Risks to Children.[11] Like the 2018 Federal Lead Action Plan, EPA's new Lead Strategy seeks to protect children's health but places a particular emphasis on reducing lead exposure in communities as a means to reduce persistent disparities in children's blood lead levels and promote environmental justice.

Key goals and objectives include:

Goal 1: Reduce Community Exposures to Lead Sources
- Objective A: Reduce Exposure in Homes and Child-Occupied Facilities with Lead-Based Paint Hazards
- Objective B: Reduce Exposure to Lead from Drinking Water
- Objective C: Reduce Exposure to Lead in Soils

[11] https://www.epa.gov/lead/federal-action-plan-reduce-childhood-lead-exposure

Objective D: Reduce Exposure to Lead Associated with Emissions to Ambient Air
Objective E: Reduce Lead Exposure Through Enforcement and Compliance Assistance
Goal 2: Identify Communities with High Lead Exposures and Improve Their Health Outcomes
Goal 3: Communicate More Effectively with Stakeholders
Goal 4: Support and Conduct Critical Research to Inform Efforts to Reduce Lead Exposures and Related Health Risks

The Lead Strategy defines challenges to achieving each of these goals and identifies actions to address them. The EPA organizes each of these actions by the three key approaches of our strategy: reducing lead exposure locally in overburdened communities, reducing lead exposure nationally, and reducing lead exposure with a "whole of EPA" and "whole of government" approach. Where relevant, the Lead Strategy points to specific case studies of past or present EPA actions to reduce lead exposure that can serve as models for future work.

The EPA will use scientific research and evidence-based approaches to prioritize and focus the Agency's actions. The EPA's national program offices and ten regions will take a multi-pronged approach by working at the national and community levels; tackling lead contamination across all media; and partnering with other federal agencies to combine resources and authorities to take on the challenge of reducing blood lead level disparities in specific communities. After incorporating public comments, the final Lead Strategy will include milestones and metrics for tracking and measuring the EPA's progress in meeting the actions described.

LEAD STRATEGY GOALS AND OBJECTIVES

GOAL 1: REDUCE COMMUNITY EXPOSURES TO LEAD SOURCES

Problem: Lead exposure results from multiple sources. For example, longstanding sources of lead exposure remain in homes, schools, childcare facilities, and other buildings with lead-based paint, old water distribution systems, and household plumbing. Soils of residential yards, parks, and schoolgrounds across the United States also can be contaminated with lead. The EPA will leverage all of its regulatory and risk management tools to provide greater protection to communities from the effects of lead.

Objective A: Reduce Exposure in Homes and Child-Occupied Facilities with Lead-Based Paint Hazards

Problem: Millions of people, especially those living in communities with environmental justice concerns, continue to be exposed to lead at home and in other buildings where lead-based paints are found in deteriorating condition (peeling, chipping, cracking, or damaged).

Communities that have a high percentage of housing or buildings built before 1978 —and especially those built before 1940 — are at risk from historical use of lead-based paint.

EPA ACTIONS:

APPROACH 1: Reduce lead exposures locally with a focus on communities with disparities and promote environmental justice

- **Enhance Lead-Safe Work Practices through Education and Outreach:** The EPA's Office of Chemical Safety and Pollution Prevention (OCSPP) is collaborating with EPA regional lead programs and community partners to implement the FY 2022 *Enhancing Lead-Safe Work Practices Through Education and Outreach* initiative. The goal of this initiative is to reduce harm to children from exposure to lead in 11 communities disproportionately affected by lead exposure by both increasing the number of certified firms under the Renovation, Repair and Painting rule (RRP) and expanding consumer demand for lead-safe work practices. The OCSPP is providing free RRP trainings (in both English and Spanish) for contractors working in the 11 communities to become RRP certified. In addition, OCSPP is offering interactive webinars to prepare tribal leaders to educate their communities about lead and the importance of hiring certified lead professionals using the *Lead Awareness in Indian Country: Keeping our Children Healthy!* Curriculum. Additionally, OCSPP is hosting two "Understanding Lead" webinars for anyone interested in learning more about lead and actions to prevent lead exposure and lead poisoning. This initiative may form the basis for further community-based efforts to protect children from lead exposure and to create new economic opportunities.

APPROACH 2: Reduce lead exposures nationally through protective standards, analytical tools, and outreach

- **Revisit the dust-lead hazard standards and dust-lead clearance levels:** The OCSPP has initiated a rule to reconsider the dust-lead hazard standards (DLHS) and dust-lead clearance levels (DLCL) in accordance with the Executive Order 13990 and consistent with a May 2021 court decision in the Ninth Circuit.[12,13] Lead inspectors, risk assessors, and abatement professionals use the DLHS to determine if dust-lead hazards are present and the DLCL to evaluate the effectiveness of cleaning following an abatement in target housing (i.e., built before 1978) and child-occupied facilities. Abatements are designed to permanently eliminate lead-based paint hazards, including dust-lead hazards. As part of this rule, EPA plans to amend its regulatory definition of target housing to conform with a 2017 statutory change to clear up regulatory ambiguity and extend the regulatory coverage to zero-bedroom dwellings (e.g., studio apartments) where children live. The EPA may revisit its lead in renovation protocol, in collaboration with HUD, to determine if its cleaning

[12] https://www.federalregister.gov/executive-order/13990

[13] https://cdn.ca9.uscourts.gov/datastore/opinions/2021/05/14/19-71930.pdf

verification procedure is effective with respect to a revised dust-lead hazard standard and/or clearance level.

- **Revisit the definition of lead-based paint:** In light of the May 2021 court decision in the Ninth Circuit, OCSPP will, in collaboration with the Department of Housing and Urban Development (HUD), revisit the definition of lead-based paint and, as appropriate, revise the definition to make it more protective. The definition is incorporated throughout the lead-based paint regulations, and application of this definition is central to how the lead-based paint program functions. The OCSPP is currently evaluating how best to move forward on this issue.

- **Support lead safe renovations in public and commercial buildings:** The EPA will continue its work to evaluate risk from renovations of public and commercial buildings pursuant to the Toxic Substances Control Act (TSCA) §402(c)(3) that directs EPA to promulgate regulations for renovations in target housing, public buildings built before 1978, and commercial buildings that create lead-based paint hazards. The EPA will determine whether such renovations create lead-based paint hazards, and, if they do, EPA will address any lead-based paint hazards by promulgating work practice, training, and certification requirements for public and commercial buildings.

APPROACH 3: Reduce lead exposures with a "whole of EPA" and "whole of government" approach

- **Collaborate on lead paint rulemakings:** The EPA will collaborate with HUD on rulemakings to address lead-based paint hazards, including dust, soil, and the definition of lead-based paint. Closer coordination will improve the ability to collectively address lead-based paint hazards.

- **Collaborate to address potential exposures to lead from food, cosmetics and consumer products, and cultural/religious products:** The EPA will collaborate with the Food and Drug Administration and the Consumer Product Safety Commission to address other sources of potential lead exposure such as foods, cosmetics, art supplies, herbal and folk remedies, non-commercial pottery, recalled toys, jewelry, furniture, and other consumer goods.

- **Work internationally to assist other countries to establish restrictive and protective laws to regulate lead-containing paint:** More than 100 countries still allow the manufacture and sale of paint with high levels of lead; most of them are lower- and middle-income countries. Communities in lower- and middle-income countries, especially underserved and vulnerable populations with children living in poverty, are disproportionately at risk for health impacts from exposures to lead paint and other lead sources. Building on the success of phasing out lead in gasoline globally, the EPA is working through a multi-stakeholder, international partnership to provide individual countries with guidance on drafting strong and effective laws to regulate lead-based paint.

REGIONAL COMMUNITY CASE STUDY: St. Joseph, Missouri is a beautiful, vibrant city on the Missouri River that struggles with a high incidence of elevated blood lead levels in children. According to data from the Centers for Disease Control and Prevention, between 16 and 20 percent of children tested from 2014 to 2017 in St. Joseph zip code 64501 showed elevated blood lead levels. Although the U.S. government banned consumer lead-based paint in 1978, lead-based paint, including lead-contaminated dust generated from it, remains one of the leading causes of lead exposure in the United States. In St. Joseph, most residential lead hazards come from homes built before 1978.

To combat this critical public health problem, EPA's Region 7 formed a cross-program outreach team to raise awareness about lead-based paint hazards in the home. The team focused on childcare providers, renovators (professional and do-it-yourself), and the general public. The team held numerous events with state, local, and federal partners that educated childcare providers, trained home renovators, facilitated discussions with community leaders, conducted lead screening in children, and provided important information to St. Joseph residents. In addition, the St. Joseph Health Department, Kansas City Missouri Health Department, EPA, and HUD held partnership meetings focused on leveraging resources and acquiring new ones to address lead hazards in the community. This resulted in $90,000 to provide lead abatement work for low-income families living in pre-1978 housing. The team's effort culminated in a lead education summit, where federal, state, and local agencies, local nonprofits, and health providers came together to discuss next steps for preventing lead poisoning in St. Joseph. While the effort to reduce elevated blood lead levels is ongoing, Region 7 is proud of the great strides St. Joseph and other partners have made to prevent exposures to lead in their community.

Objective B: Reduce Exposure to Lead from Drinking Water

Problem: Lead exposure through drinking water continues to be a serious risk in many communities, including those facing other environmental justice concerns. Lead can enter drinking water from plumbing materials that contain lead or from lead pipes that connect the home to the water main. In homes with lead pipes that connect the home to the water main, also known as lead services lines, these pipes are typically the most significant source of lead in the water. Among homes without lead service lines, the most common problems are with old brass or chrome-plated brass faucets and plumbing with lead solder. The amount of lead allowed in new pipes, solder, flux fittings or fixtures was limited in 1986 and further reduced in 2014. Galvanized pipes that were or are downstream of lead service lines are also a concern because they may accumulate lead from upstream sources.

There are still 6 to 10 million lead service lines in cities and towns across the country, many of which are in low-income neighborhoods and communities of color. The Bipartisan Infrastructure Deal will provide $15 billion in funding to address lead in drinking water by replacing service lines and carrying out associated activities that are directly connected to identifying, planning, designing, and replacing lead service lines. This historic investment will allow us to make rapid progress toward President Biden's goal of removing 100% of lead service

lines. This means that millions of families will be able to rely on drinking water that is safe from lead and other contaminants.

Unfortunately, the locations of lead pipes, solder, faucets, and fixtures are not always known, which presents challenges for targeting risk management efforts. Replacing lead service lines and in-home water systems also is quite costly; however, reducing drinking water lead exposure generates significant health benefits. EPA's 2021 economic analysis of the benefits of lead service line replacement shows significant increases in lifetime earnings associated with avoided intelligence quotient (IQ) loss in children, as well as reduced risks of other adverse health effects across the lifespan, including cardiovascular disease and kidney disease.[14]

EPA ACTIONS:

APPROACH 1: Reduce lead exposures locally with a focus on communities with environmental justice concerns

- **Target communities with high levels of lead in drinking water:** The EPA will identify community water systems with high levels of lead in their drinking water. The EPA will implement solutions to reduce lead exposure in these communities, including targeting funding and technical assistance, particularly in disadvantaged communities. The Agency understands the impacts of lead service lines on communities with environmental justice concerns and will be focused on identifying and implementing solutions to identify and replace lead service lines. The EPA's strategies, which continue to be tailored through community engagement, include improving public outreach and education, encouraging proactive replacement of full lead service lines, providing technical assistance on proper sampling techniques, improving corrosion control treatment, and supporting the 3Ts (*Training, Testing, and Taking Action*) to reduce lead in drinking water at schools and childcare facilities.

- **Provide Drinking Water State Revolving Fund loans and drinking water grants to reduce lead in drinking water:** The Bipartisan Infrastructure Deal provides $15 billion through the Drinking Water State Revolving Loan Fund to address lead in drinking water by replacing service lines and carrying out associated activities that are directly connected to identifying, planning, designing, and replacing lead service lines. There is no state match requirement for these funds and 49% of the money will be provided as grants or principal forgiveness loans to communities. The EPA will increase awareness, particularly in small, underserved communities and communities of color, about programs and funding opportunities to replace lead service lines, regardless of ownership, and reduce lead in drinking water. Funding from these programs can replace lead service lines, including lines on private property; develop lead service line inventories; install or improve corrosion control treatment; and remove lead from drinking water in schools and childcare facilities. The EPA

[14] https://www.regulations.gov/document/EPA-HQ-OW-2017-0300-1769

relies on congressional appropriations to fund these drinking water grant and loan programs.

- **Award funding and support implementation for the Lead Testing in School and Childcare Program Drinking Water Grant Program:** The EPA awards funding to states, territories, and tribal consortia to support training and technical assistance for schools and childcare programs to train staff and test drinking water for lead. The funding also supports technical assistance to schools and childcare facilities on follow-up options[15] and possible funding sources for remediation when lead is detected. The Bipartisan Infrastructure Deal is expanding grant funding to include lead remediation and compliance monitoring as eligible projects and activities.

APPROACH 2: Reduce lead exposures nationally through protective standards, analytical tools, and outreach

- **Review the 2020 Lead and Copper Rule Revisions (LCRR)**: EPA is reviewing the Lead and Copper Rule Revisions.[16] The Agency's review has included a series of virtual public engagements to hear directly from a diverse set of stakeholders. To get comprehensive input, EPA talked with states, tribes, water utilities, as well as people who have been underrepresented in past rule-making efforts. EPA sought input from communities disproportionately impacted by lead in drinking water to learn from their experiences. EPA expects to announce the results of its LCRR review prior to the rule's effective date of December 16, 2021.

- **Implement the Lead and Copper Rule (LCR), including oversight of states and tribes with primacy**:[17] The EPA is partnering with primacy agencies to provide training and technical assistance and develop additional guidance and information systems to support implementation of existing requirements for reducing lead in drinking water. This work focuses on having primacy agencies proactively support lead service line inventories and full lead service line replacement programs, discouraging partial replacement, and updating the Safe Drinking Water Information System to support collecting and reporting inventory data.[18] Other work includes improving guidance and templates to help states and public water systems communicate lead risk to households and communities with lead service lines; revising the Consumer Confidence Report Rule to include more information about actions to control lead; and developing materials that describe the risks posed by partial

[15] Follow-up options include activities such as turning off or removing the specific outlet that has tested high for lead, posting signs to not use certain outlets for drinking or cooking, conducting follow-up sampling to identify specific components that might be the source(s) of lead, instituting flushing programs, installing filters, and/or replacing plumbing, fittings and fixtures.

[16] https://www.epa.gov/ground-water-and-drinking-water/revised-lead-and-copper-rule

[17] The EPA authorizes states to have primary enforcement responsibility (also called primacy) for public water systems to states and Indian Tribes if they meet certain requirements.

[18] https://www.epa.gov/ground-water-and-drinking-water/safe-drinking-water-information-system-sdwis-federal-reporting

lead service line replacement and measures to reduce lead concentrations following replacement (e.g., flushing plumbing, use of filters, and follow-up testing).[19]

APPROACH 3: Reduce lead exposures with a "whole of EPA" and "whole of government" approach

- **Provide resources to schools, childcare facilities, and states:** The EPA will continue to chair an interagency and stakeholder group under the Memorandum of Understanding on Reducing Lead Levels in Drinking Water in Schools and Childcare Facilities, which includes EPA; several offices within the Department of Health and Human Services (HHS), including the Centers for Disease Control and Prevention, Indian Health Service, and the Administration for Children and Families' Office of Head Start and Office of Early Childhood Development; and the Departments of Agriculture (USDA), Education, and Interior, as well as nine non-federal associations. [20] This interagency group works together to provide schools, childcare facilities, and states with education on health concerns associated with lead in drinking water; helps develop lead testing programs using EPA's *3Ts (Training, Testing, and Taking Action) for Reducing Lead in Drinking Water in School and Childcare Facilities*; works with schools and childcare facilities to establish a sustainable and effective lead in drinking water testing program; and connects schools and childcare facilities that find lead in their drinking water with funding resources for remediation, such as USDA's Community Facilities Grant Programs.

  The EPA will continue to develop tools and trainings through the 3Ts program and work with MOU partners to provide input on and review of products and to help promote final products.

- **Collaborate on lead testing for drinking water:** The EPA will work with HHS to implement lead testing programs in drinking water at facilities funded by that Department's Office of Head Start and the Office of Childcare.

REGIONAL COMMUNITY CASE STUDY: Elevated levels of lead were identified in drinking water at the Campo Golden Acorn Casino near San Diego, California. Lead concentrations in more than 10 percent of samples exceeded the EPA's lead action level of 0.015 microgram per liter. The results of these samples, taken by the Campo Kumeyaay Nation, prompted action by the EPA under the Lead and Copper Rule.

The casino, which serves approximately 1,000 customers per day and upwards of 50 staff, needed upgrades to both the drinking water plumbing and the corrosion control treatment system to prevent the leaching of lead from service lines and fixtures. A plumbing inventory was conducted by the casino, and all possible lead-containing components, such as pipes, fittings, and faucets, were removed and replaced. Concurrently, EPA Region 9 staff assisted the

[19] https://www.epa.gov/ccr/consumer-confidence-report-rule-and-rule-history-water-systems
[20] https://www.epa.gov/sites/production/files/2019-10/documents/mou_reducing_lead_in_drinking_water_in_schools_final.pdf

water system to design an appropriate orthophosphate treatment dosage and develop optimal water quality parameters to ensure the effectiveness of the new corrosion control system.

The water system continued to sample for lead in the distribution system at an increased frequency and over the years that followed observed a gradual decrease in the number of lead action level exceedances. This trend has continued, with lead levels decreasing and all 30 samples collected during 2020 indicating "non-detect" for lead, which is well below the action level. As a result, the casino's drinking water is no longer exposing patrons and staff to unsafe lead levels.

Objective C: Reduce Exposure to Lead in Soils

Problem: Lead is a naturally occurring element generally found in soil at low levels. In many locations across the United States, however, the concentrations of lead in soils are much higher because of human activities – especially in and around urban areas, in areas with lead mining activities and smelting, and near older homes with lead-based paint, often in low-income communities and communities of color. Soil-lead contamination can also occur from past industrial operations that involved lead, from lead-based paint cracking, flaking, and peeling off homes and buildings, and from past use of leaded gasoline, especially in housing near highways or heavily travelled city streets. Lead contamination from the past, sometimes from multiple sources, can accumulate and remain an ongoing threat.

Children and adults can be exposed to lead in soil through incidental ingestion of contaminated soils by touching their mouth with their hands (typically in young children), but also by adults working in soils or gardening. Soil contaminated with lead can be tracked into homes or other buildings, which can result in ingestion of contaminated house dust.[21] In some cases, eating fruits and vegetables grown in lead-contaminated soil is another route of exposure.

EPA ACTIONS:

APPROACH 1: Reduce lead exposures locally with a focus on communities with disparities and promote environmental justice

- **Clean up lead contaminated sites:** The EPA will prioritize cleaning up lead in communities contaminated by lead from industrial operations, mining, smelting, and other activities, based on risk of potential adverse health effects, and will focus on communities with the greatest exposures and promote environmental justice. The EPA will work with states, tribes, and others at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) removal and remedial sites and Resource Conservation and Recovery Act (RCRA) corrective action sites to address lead contamination.

[21] Clark S, Menrath W, Chen M, Succop P, Bornschein R, Galke W, and Wilson J. (2004) The Influence of Exterior Dust and Soil Lead on Interior Dust Lead Levels in Housing that had Undergone Lead-Based Paint Hazard Control, Journal of Occupational and Environmental Hygiene, 1:5, 273-282, https://doi.org/10.1080/15459620490439036

APPROACH 2: Reduce lead exposures nationally through protective standards, analytical tools, and outreach

- **Revise the Soil Lead Policy for Contaminated Sites to further reduce the potential for exposure to lead in soil:** The soil lead policy for contaminated sites, last updated in 1998, provides recommendations for cleaning up lead contaminated soils at CERCLA and RCRA sites.[22] The EPA plans to set new recommendations for screening sites and strengthen preliminary remediation goals to reduce lead exposure in communities and protect human health and the environment in accordance with the latest science.

- **Revisit the soil-lead hazard standards:** In light of a May 2021 court decision in the Ninth Circuit, EPA will revise the 2001 soil-lead hazard standards.[23] The soil-lead hazard standards, under Title IV of the Toxic Substances Control Act, identify lead-contaminated soils at target housing (i.e., built before 1978) and pre-1978 child-occupied facilities that would result in adverse human health effects. Soils that contain lead at levels determined to be hazardous to human health are considered contaminated. Lead inspectors, risk assessors, and abatement professionals use the soil-lead hazard standards to determine if soil-lead hazards are present and to inform options for reducing risk.

APPROACH 3: Reduce lead exposures with a "whole of EPA" and "whole of government" approach

- **Work with HUD to reduce lead exposure to protect families, particularly children, in overburdened and underserved communities:** In EPA's Draft FY 2022-2026 Strategic Plan, EPA and HUD proposed a joint Agency Priority Goal (APG) for 2022-2023 to reduce exposure to lead to protect families, particularly children, in overburdened and underserved communities by HUD controlling indoor environmental hazards in housing at, or near, sites where EPA is completing Superfund lead cleanup projects.

- **Use a collaborative approach for reducing lead at Superfund sites:** The EPA is working to promote more effective collaboration at the local, state, territorial, tribal, and federal levels to address multiple sources of lead in communities near Superfund sites where lead is a contaminant of concern. The EPA's Superfund program will work with a broad range of stakeholders to leverage multiple authorities and tools to address lead exposures beyond the site releases, for example, lead-based paint or lead in drinking water.

- **Support community-driven Brownfields assessment, cleanup, and revitalization:** The EPA will continue to respond to requests for technical assistance to help community-driven cleanups to revitalize sites with lead and other contaminants. The EPA will also organize annual Brownfields grant competitions that allow tribes, states, and communities to seek

[22] https://www.epa.gov/superfund/lead-superfund-sites-guidance
[23] https://www.govinfo.gov/content/pkg/FR-2001-01-05/pdf/01-84.pdf

funds to assess, clean, and plan for the safe reuse of Brownfields, including the creation of community lead-safe spaces.

REGIONAL COMMUNITY CASE STUDY: When cleanup of lead at the USS Lead Superfund site began in 2016, residents in East Chicago, Indiana were concerned and largely unaware of the cleanup process. This large-scale residential yard cleanup began with an emergency response to lead contamination in soil at several hundred homes, drawing media, community, and political interest. Because of the intensive and comprehensive team effort, the entire cleanup was safely and substantially completed nearly a year ahead of schedule. This extraordinary effort was the result of dedicated coordination between all EPA Region 5 programs involved, the Agency for Toxic Substances and Disease Registry (ATSDR), the US Department of Housing and Urban Development, and state and local health departments.

The EPA prioritized the USS Lead site after Region 5 recognized that more than 1,000 residential properties could be contaminated with high levels of lead and arsenic in the soil. Initial plans called for intensive efforts to complete all sampling and cleanup at these properties by late 2020 or early 2021. To engage with the impacted residents under this aggressive cleanup schedule, Region 5 implemented innovative efforts, including the Superfund Jobs Training Initiative program and a creative community event. The Jobs Training Initiative program for East Chicago residents resulted in the hiring of 10 trainees by site cleanup contractors to help with the lead cleanup in their own community. The EPA also partnered with the ATSDR and local health agencies to host a superhero-themed community event with free entertainment and food trucks and a mobile blood testing unit to encourage families to have their children's blood lead tested.

With these actions and more, the affected community at the USS Lead Site remained engaged in their cleanup work and helped move the cleanup along expeditiously. The EPA's efforts fostered a positive relationship with the community and at the same time accelerated removal of contaminated soils from the impacted residential properties in East Chicago.

Objective D: Reduce Exposure to Lead Associated with Emissions to Ambient Air

Problem: Lead emitted into the air can contribute to multiple pathways of exposure that can pose risks to human health and the environment. For example, lead from ambient air can contribute to lead in soil and related pathways, as well as indoor air and dust. The extent of air-related pathway contributions to exposures and risk depends largely on source and community characteristics. The EPA will assess and reach conclusions on hazards, potential exposures, and risks; set and implement standards to limit emissions and air concentrations; and work with state and local agencies to monitor air quality near sources and ensure compliance with the standards.

EPA ACTIONS:

APPROACH 1: Reduce lead exposures locally with a focus on communities with disparities and promote environmental justice

- **Implement the National Ambient Air Quality Standards (NAAQS) for lead to reduce emissions to ambient air in communities:** Air emissions of lead have the greatest impact near the pollution source. As a result, areas where the lead NAAQS is not met are located near the sources. The EPA will work with state and local air agencies in these communities on actions to reduce ambient air emissions to meet the standards and protect public health.

APPROACH 2: Reduce lead exposures nationally through protective standards, analytical tools, and outreach

- **Reviewing the National Ambient Air Quality Standards for lead:** To inform the latest review of the lead NAAQS, EPA's Office of Research and Development will develop a new Integrated Science Assessment (ISA) for lead. The new ISA will contain a concise policy-relevant evaluation and synthesis of the current scientific information on lead, including sources, environmental distribution, and exposures to ambient air lead (both airborne and deposited), and the EPA's conclusions on the health and welfare effects of lead. Based on the new ISA and current information on air quality, exposure and risk, the Office of Air and Radiation will develop an assessment of the policy implications with regard to the adequacy of protection provided by the existing NAAQS and any potential alternative policy options. The EPA will rely on the findings in these documents, advice from the Clean Air Scientific Advisory Committee, and public comments to inform the Agency's decision whether to retain or revise the current NAAQS for lead.

- **Update emissions standards for lead-emitting sources:** The EPA is reviewing emissions standards, including National Emissions Standards for Hazardous Air Pollutants and New Source Performance Standards, for lead-emitting sources to incorporate developments in technologies and/or address risk concerns. The Office of Air and Radiation will make regulatory decisions for the major lead-emitting source categories, including primary copper smelters (major and area sources), lead acid battery manufacturing (area sources), and secondary lead smelters. Updating these standards will strengthen regulatory tools for minimizing impacts of these lead sources in nearby communities.

APPROACH 3: Reduce lead exposures with a "whole of EPA" and "whole of government" approach

- **Reduce lead from piston-engine aircraft:** The EPA will collaborate and coordinate with the Federal Aviation Administration and other agencies on lead reduction opportunities from piston-engine aircraft, which still use leaded aviation gasoline. This collaborative work will include responding to National Academy of Sciences recommendations regarding options for reducing lead emissions from these aircraft.[24]

[24] https://www.nap.edu/catalog/26050/options-for-reducing-lead-emissions-from-piston-engine-aircraft

REGIONAL COMMUNITY CASE STUDY: In 2018, the State of Indiana issued a 10-year minor source air permit renewal to Whiting Metals, Limited Liability Company (LLC), a lead metal reclamation facility located in Hammond, Indiana. During the permit review, the EPA identified an incorrect emissions factor resulting in a large underestimate of potential lead emissions to the air. The EPA conducted air dispersion modeling, using the corrected emissions levels, and discovered that there was potential for violations of the lead NAAQS. In addition to the concerns about air emissions from the facility, the EPA's Superfund and Emergency Management Division was conducting remediation activity in the surrounding community to remove lead-contaminated soil deposited by a former secondary smelter that operated on the Whiting Metals, LLC property from 1937 to 1983. The soil surrounding multiple households and other publicly accessible areas exceeded the removal management level for lead.
The EPA worked with the state to deploy ambient lead monitors adjacent to the facility's property in August 2018 and sampled on a daily basis. Within the first month of monitoring, recorded concentrations exceeded the NAAQS. In November 2018, the EPA's Enforcement and Compliance Assurance Division issued a joint notice of violation with the state to the facility.

Due to the remediation activities and an earlier incomplete RCRA cleanup on the Whiting Metals, LLC property (2001-2005), re-entrainment was another potential source of ambient lead. To further investigate the source of the lead, the EPA deployed its multi-metals monitoring trailer and staff, which provided hourly metals concentrations and corresponding meteorological information. This additional information was useful because it provided higher time resolution data that can reveal sources of pollution. Over the next year, EPA collected hourly monitoring data and was able to accurately attribute the primary source of ambient lead to Whiting Metals, LLC's operations, rather than to any remediation activities or re-entrainment. Due to economic influences, the facility ceased operations in June 2020, and the state revoked its permit at the end of the year.

Objective E: Reduce Lead Exposure Through Enforcement and Compliance Assistance

Problem: Americans continue to be exposed to lead in lead-based paint, soil, dust, sediment, air, and drinking water. Certain segments of the population, including children, may be more vulnerable and disproportionately affected. Some of these exposures result from noncompliance with laws designed to reduce or eliminate exposure. In addition to working to prevent new lead exposures and clean up legacy contamination, EPA will address exposures associated with noncompliance and environmental liability. The EPA will continue to implement its wide range of authorities to address noncompliance, obtain cleanups, deter future violations, and mitigate harms where it has authority and resources to do so.

EPA ACTIONS:

APPROACH 1: Reduce lead exposures locally with a focus on communities with disparities and promote environmental justice

- **Enhance enforcement and compliance assurance in communities with environmental justice concerns:** The EPA's Office of Enforcement and Compliance Assurance (OECA) will prioritize high-impact cases that address the needs of communities experiencing adverse and disproportionate environmental and health risks and harms from lead, and promoting environmental justice.

- **Increase impact of lead exposure reduction projects:** The OECA and the regional offices will identify and support potential opportunities to implement lead exposure reduction projects that are obtained through enforcement actions.[25] The OECA will strive to focus them on communities disproportionately impacted by lead.

- **Expand geographic initiatives and cross-program enforcement and compliance collaboration:** The OECA will promote geographic initiatives in the ten EPA Regions that focus efforts on a specific area or community. The OECA and its regional partners will use mapping, predictive, and screening tools to identify areas of concern, including lead hot spots and communities with more than one source of lead exposure. The OECA and EPA Regions will use mapping, predictive, and screening tools to identify areas of concern and to prioritize enforcement and compliance assurance activities. For example, OECA and EPA Regions will continue implementing lead-based paint geographic initiatives, particularly in areas with the greatest lead exposures and collaborate with other EPA programs and interested external stakeholders to identify opportunities to use enforcement and compliance assurance to reduce lead exposures from other media, such as drinking water or soils.

APPROACH 2: Reduce lead exposures nationally through protective standards, analytical tools, and outreach

- **Improve compliance monitoring and enforcement to reduce lead exposure:** The EPA will develop tools to improve compliance monitoring and enforcement and address lead exposures from all media sources. To ensure proper evaluation of sampling and treatment to support Lead and Copper Rule (LCR) enforcement, OECA will issue a national LCR Inspection Protocol for federal, tribal, and state drinking water inspectors. Collaborating with Customs and Border Protection on compliance activities will support the "lead free" plumbing requirements of the Safe Drinking Water Act section 1417. Guidance, protocols and/or compliance information will be developed to improve enforcement in communities with the great lead exposures and support a multi-media approach to address lead contamination in these communities. The EPA will address gaps in selected Agency policies pertaining to lead-safe work practice standards and other lead-based paint requirements that create barriers to more effective enforcement, such as revisiting the RRP rule and updating the definition of "target housing" to conform to the statute.

[25] Examples of projects resulting from enforcement include mitigation, site cleanups, or voluntary lead-based paint abatements under Supplemental Environmental Projects, contingent upon the Department of Justice revising its rule that generally prohibits such projects (28 CFR 50.28. Prohibition on settlement payments to non-governmental third parties. 85 FR 81409-81411. https://www.federalregister.gov/d/2020-27189)

Actions will focus on high-impact cases using EPA's various compliance assurance authorities and tools to address violations related to lead in all environmental media and paint, particularly violations affecting overburdened communities.

- **Increase enforcement for lead site cleanups:** The EPA will use all appropriate enforcement authorities to clean up lead contaminated sites and continue to pursue Potentially Responsible Parties (PRP) for cleanup of lead released into the environment, including in residential yards, play areas, and other locations where children are commonly exposed to lead. The EPA will increase internal collaboration to identify situations, consistent with current law and policy, where the Agency will seek to have PRP perform or pay for cleanup to address lead contamination inside residential housing or other structures where children and other sensitive subpopulations may face exposure to lead.

APPROACH 3: Reduce lead exposures with a "whole of EPA" and "whole of government" approach

- **Identify sources of potential lead exposure to improve targeting:** The OECA will work with partners across EPA and in other federal agencies to further refine OECA's analytical lead mapping capabilities (currently the Lead Occurrence and Source Tool) to enable national enforcement programs to identify where people may be exposed to lead and what authorities EPA may apply to address those exposures, such as from lead in drinking water, lead-based paint, lead-contaminated soils, or air emissions. This includes continuing to work within EPA and with external partners to incorporate data and to map locations of highest potential lead exposure at national, state, and local scales.

- **Enhance collaborative relationships with key federal agencies, states, tribes, and local partners**: The OECA will identify opportunities to share information and pursue partnerships that leverage our respective authorities and resources to eliminate lead exposures. Working with agency partners, the EPA will engage with the Department of Defense to address lead exposures at privatized military housing. The EPA will partner with health agencies for blood lead level data, states to support local drinking water systems in developing lead service line information and to enforce the prohibition on use of non-lead-free plumbing materials, and HUD to explore collaboration opportunities and acquire data on pre-1978 housing. The EPA will use such engagement and data to further refine EPA's mapping capabilities and ability to identify disproportionately impacted communities. These partnerships will also support OECA's goal of helping co-regulators build their capacity to address lead exposures in local communities under their respective authorities.

MULTI-REGIONAL COMMUNITY CASE STUDY: When large renovation firms such as Home Depot U.S.A. Inc.,[26] do not comply with the law, the noncompliance may disproportionately affect communities with environmental justice concerns. The EPA targeted compliance monitoring in communities overburdened by exposure to lead-based paint and found that

[26] Mention of this company name does not imply endorsement

Home Depot was in violation of the Agency's lead-based paint Renovation, Repair and Painting (RRP) Rule, and of EPA-approved federally equivalent state renovation rules. As a result, Home Depot is implementing the provisions of a settlement reached in 2020, including payment of a penalty of $20.75 million, to resolve an enforcement action brought by EPA and the Department of Justice, joined by the States of Utah, Massachusetts, and Rhode Island. The civil penalty is the highest to date for any settlement under the Toxic Substances Control Act.

Under the settlement, Home Depot is implementing a company-wide program to ensure that its contractors comply with the RRP Rule that applies to renovations of homes built before 1978. The settlement also requires Home Depot to conduct thousands of on-site inspections of work performed by its contractors to ensure they comply with lead-safe work practices. The Home Depot must also investigate and respond to customer complaints, and EPA is monitoring Home Depot's response. Where the contractor has not complied with lead-safe work practices, Home Depot must perform an inspection for dust lead hazards and, if found, provide a specialized cleaning. Also, Home Depot is providing important information concerning following lead-safe work practices to its professional and do-it-yourself customers in its stores, on its website, on YouTube, and in workshops.

GOAL 2: IDENTIFY COMMUNITIES WITH HIGH LEAD EXPOSURES AND IMPROVE THEIR HEALTH OUTCOMES

Problem: Exposure to lead across the country is inequitable, with communities of color and lower socioeconomic status often facing the greatest exposure and experiencing health impacts that can exacerbate existing health inequities.

In many instances, locations with high lead exposures are identified only after the exposures have taken place, which are often detected as elevated blood lead levels in children. Unfortunately, blood lead testing programs and practices vary widely state to state, ranging from several states with mandatory testing requirements to others with none at all. States also differ in how and to what extent they report available blood lead level data to the Centers for Disease Control and Prevention (CDC). With variations in testing and reporting, whatever data are available nationwide very likely represent an underreporting of children who have elevated blood lead levels and are exposed to lead hazards.

EPA ACTIONS:

APPROACH 1: Reduce lead exposures locally with a focus on communities with disparities and promote environmental justice

- **Identify lead 'hot spots':** The EPA, in collaboration with HHS and HUD, will implement science-based approaches for identifying communities and subsections of communities at the census tract or other local geographies with high lead exposure potential and probable

sources of exposure in those communities. This information can inform where to provide enhanced community outreach and EPA actions. These approaches will use available data, statistical models, and geospatial analysis including blood lead level surveillance data collected by states, tribes, territories, federal agencies, and local governments; and environmental, socioeconomic, and demographic data, including indices from the EJSCREEN environmental justice screening and mapping tool[27], as surrogates for potential exposures.

- **Ascertain the dominant lead exposure pathways**: The EPA will identify and evaluate local-scale information (e.g., presence of lead-based paint and lead-based paint hazards, lead in drinking water, and other exposure pathways) to supplement known mapping and scientific information with local knowledge; and use 'on the ground' efforts, typically facilitated by government entities and, as appropriate, incorporate community (citizen) science approaches.

- **Focus EPA lead reduction actions on overburdened communities where lead exposures and prevalence of elevated blood lead levels are among the highest**: Targeting technical and financial resources to address documented priorities will generally provide the largest public health protection and the most efficient use of resources. In partnership with communities, EPA will develop and implement action plans for interventions in these areas. Interventions may include collaboration on funding (e.g., grants, technical assistance); partnerships with community organizations, faith-based institutions, foundations; and coordinated actions to achieve compliance. The EPA's Regional Children's Health Coordinators will support regional actions to reduce and address children's exposure to lead in all media and enhance caretaker knowledge to better protect children from exposures to lead.

- **Provide more job training for removing lead hazards:** Identifying and addressing lead hazards requires training, skills building, work experience, and certification. The EPA will support training for lead-based paint remediation through community workforce development and expansion. The EPA also will promote trainings through Brownfields job training grants, workforce-development partnerships with local training organizations and employers, and local markets that seek certified staff in remediation for lead-based paint abatement.

APPROACH 2: Reduce lead exposures nationally through protective standards, analytical tools, and outreach

- **Increase cross-agency coordination on lead policies, regulations, and invest in community science and monitoring:** The EPA staff will support its engagement, in a range of intra- and inter-agency activities, to help focus risk management actions to address lead exposures in overburdened communities. Efforts will include working with the Lead Subcommittee of the *President's Task Force on Environmental Health Risks and Safety Risks to Children,* and its 17

[27] https://www.epa.gov/ejscreen

federal agency and department members, which serves as a forum to foster interagency collaborations.

- **Enhance citizen science on lead:** The EPA will support the use of community and citizen-science through the development of easy-to-use, reliable, and accurate data monitoring tools, systems for facilitating data sharing with communities, and systems and platforms to make data analysis and interpretation readily accessible to community stakeholders and decision makers at all levels of government.

APPROACH 3: Promote a "whole of EPA" and "whole of government" approach

- **Collaborate across agencies and departments to identify and address lead hotspots in the U.S.:** The CDC, EPA, and HUD will coordinate their efforts to identify lead hot spots by sharing information and collaborating on mapping and other tools. These agencies will also collaborate to identify measures that can be taken to address lead exposure for other at-risk groups including seniors and individuals with disabilities.

- **Support the pediatric clinical care community to protect children from exposures to lead:** The EPA's Office of Children's Health Protection will continue to work with the Agency for Toxic Substances and Disease Registry to support the Pediatric Environmental Health Specialty Units (PEHSUs). The PEHSUs are a national network of experts in the prevention, diagnosis, management, and treatment of health issues that arise from environmental exposures from preconception through adolescence. They provide integration of environmental health into clinical care and public health while supporting communities to address historical injustices and ongoing environmental racism.

REGIONAL COMMUNITY CASE STUDY: Starting in 2001, EPA Region 1 worked with many local partners to identify remaining areas and sources of lead risk in Boston, Massachusetts communities and invested resources with a goal to "Virtually End Childhood Lead Poisoning in Boston by 2010." The Region 1 used GIS mapping with data from census layers including housing built before 1950 and areas with children under the age of six to identify focus areas. Additional information from the local health department illustrated that about 70 percent of the childhood elevated blood lead cases were only in a handful of Boston neighborhoods. Dorchester and Roxbury had the highest number of children with elevated blood lead levels. Recognizing that lead risk was not spread equitably across neighborhoods, Region 1 and its partners focused on neighborhoods that needed the most help. The Region 1 worked with local nonprofit organizations including the Lead Action Collaborative to create a visual exterior assessment checklist deployed by EPA staff and volunteers to over 15,000 houses in high-risk areas to assess housing conditions for items that may indicate presence of lead risk including peeling paint, presence of bare soil and/or paint chips, and other factors.

The Region 1 brought the full power of available agency resources, including inspections, technical assistance, soil sampling, and grants, and its partners' resources including abatement funds, lead service line replacement, and outreach, directly to the neighborhoods to help across

programs. Region 1 conducted over 60 lead inspections for TSCA 1018 Lead Disclosure and Renovation Repair and Painting Rule compliance and followed with appropriate enforcement actions. Cases were settled for over $1 million in penalties and more than $5.7 million in supplemental environmental projects, including one of the largest enforcement actions of its kind, which removed lead hazards from 10,400 apartments in the state. The Region 1's soil sampling identified hot spots for action. Lead service line replacement was prioritized in target areas along with education, outreach, and assistance to regulated entities, schools, and families on how to minimize lead exposure from paint, dust, drinking water, and soil.

Since launching joint targeting efforts with state, local government, and many community partners in 2001, the number of elevated blood lead levels in Boston children dropped from 1,123 cases in 2001 to 163 cases in 2010.[28] Although Region 1's initiative ended in 2010, progress continued. The most recent data available from 2017 reported 51 confirmed cases at the 10 micrograms per deciliter benchmark. The Region 1's Boston community lead pilot demonstrates that sustained investment in a geographic area across media can achieve impressive and sustainable results.

GOAL 3: COMMUNICATE MORE EFFECTIVELY WITH STAKEHOLDERS

Problem: In many communities, parents, families, and childcare providers are often not aware of lead until elevated blood lead is measured in children or adults. Under federal, state, and tribal authorities, the education of primary caregivers on potential lead risks and exposure pathways is often insufficient. The EPA will support and help community stakeholders to give parents, families, and other caregivers the right information at the right time in multiple languages, using accessible electronic and information technology, and in plain language to prevent lead exposure from all key sources – lead-based paint, lead dust, drinking water, soil, and air. Education and outreach efforts can also help inform communities about minimizing lead exposure and resulting adverse health effects for people of other age groups.

EPA ACTIONS:

APPROACH 1: Reduce lead exposures locally with a focus on communities with disparities and promote environmental justice

- **Create targeted plain language multi-media education, training, and outreach materials**: The EPA will raise public awareness in communities with the highest number of children with elevated blood lead levels to give parents, families, and other stakeholders information

[28] As defined by using the prior benchmark of 10 Pb ug/dL. CDC adopted a blood lead reference value of 5 ug/dL in 2012 for determining what constitutes an elevated blood lead level. In order to make a comparison with the 2001 analysis the older benchmark value of 10 ug/dL was used. Lack of available data preclude comparison with the current blood lead reference value.

on how to prevent lead exposure from lead-based paint dust, drinking water, soil, and air (if applicable). Efforts will also include outreach to the lead-based paint renovation and repair stakeholders (discussed in greater detail in Goal 1, Objective A). Materials will be translated for persons with limited English proficiency and made accessible for persons with disabilities as needed to reach all populations at risk in targeted geographic areas as well as local businesses, including contractors, plumbers, and realtors.

- **Support development of community-based tools**: The EPA will work with other federal agencies, state, tribal, and local governments to support community-based tools. For example, the Flint Registry[29] was a tool built by the community to provide access to information and resources important to them. This tool was developed with a grant from HHS and has been recognized for its value in addressing the communities' needs for data and collaboration.[30]

APPROACH 2: Reduce lead exposures nationally through protective standards, analytical tools, and outreach

- **Develop and deploy coordinated educational and prevention messages at a national scale**: The EPA will work with the other federal agencies to develop a national repository of materials on lead and make it available to the public. The EPA will use evidence-based strategies to develop community-scale interventions to assess which approaches are most effective in achieving the goals of reducing lead exposures and adverse health effects.

- **Develop and improve guidance, templates, and risk communication materials to support training, outreach, and community engagement:** The EPA will improve guidance and templates to help states and communities communicate lead risk to households with higher risks for lead exposure (e.g., from lead-based paint, lead service lines) and measures to reduce lead exposures. Efforts will also include revisions of drinking water regulations and guidance (discussed in greater detail in Goal 1 Objective B). Materials will be translated for persons with limited English proficiency and made accessible for persons with disabilities as needed to reach all populations at risk in targeted geographic areas.

APPROACH 3: Reduce lead exposures with a "whole of EPA" and "whole of government" approach

- **Promote National Lead Poisoning Prevention Week:** Each October, EPA partners with CDC, HUD, and other interested federal agencies and stakeholders, to raise awareness, provide resources, and encourage preventive actions to decrease childhood lead exposure during National Lead Poisoning Prevention Week. These efforts will aim to bring together individuals, organizations, industry, and state and local governments to raise awareness of lead poisoning prevention and reduce childhood exposure to lead with a focus on children's

[29] https://www.flintregistry.org
[30] Indiana Advisory Committee to the U.S. Commission on Civil Rights (2020)

health and communities with greatest exposures to lead. Objectives include highlighting the many ways parents can reduce their children's exposure to lead and prevent the serious health effects of lead, with a focus on the hazards of lead-based paint in pre-1978 housing, schools, and childcare facilities; and increasing awareness of the Lead Renovation, Repair and Painting Rule.

- **Support use of the Tribal Lead Curriculum:** Using the *Lead Awareness in Indian Country: Keeping our Children Healthy!* Curriculum, EPA's Office of Chemical Safety and Pollution Prevention and Office of Research and Development are preparing tribes and community leaders to teach the robust set of educational tools that provide practical, on-the-ground, community-based resources to reduce childhood lead exposure within their own communities. The Curriculum creates a starting point to hold informed conversations within communities to teach parents and caregivers about lead. This Curriculum empowers individuals to act within their own homes to protect their children and communities from potential lead exposure.

- **Consult with children's environmental health experts through the federal advisory committee the Children's Health Protection Advisory Committee (CHPAC):** The EPA will seek advice from the CHPAC to better focus and improve the Agency's efforts to protect and remedy children from exposures to lead and to enhance our "whole of EPA" and "whole of government" approach.

REGIONAL COMMUNITY CASE STUDY: In 2015, EPA selected Memphis, Tennessee to participate in EPA's *National 6 Cities Permitting Initiative* that focused on encouraging building permit offices to amend permit applications to require lead-paint certification. The EPA Region 4 coordinated with local stakeholders to form the Memphis Lead Stakeholders Group to support an 18-month pilot project, which included community outreach and education, lead regulatory workshops, and certification training. The stakeholder group consisted of approximately 100 representatives from local government, education, health professionals, and non-profits.

The Memphis Lead Stakeholders Group coordinated with Region 4 to create #EPAday, a lead safety outreach event held at LeMoyne-Owen college, to increase awareness about the importance of lead-safe renovation and repairs, which reached 925 students in grades PreK-12 and 1200 LeMoyne-Owen college students. The EPA offered initial and refresher Renovation, Repair, and Painting (RRP) certification training to 100 contractors and organized the "What is RRP?" regulatory awareness workshop to approximately 50 contractors, renovators, and community stakeholders. Region 4 also coordinated with the Shelby County permitting office to add a stamp to current permit applications emphasizing the certification requirement to work on homes built before 1978.

The Memphis Lead Stakeholders Group continues to meet and has proven to be a successful example of the benefits of strong outreach to build community partnerships to address lead

issues. Region 4 is continuing work with the Memphis Stakeholder Group while supporting the development of Stakeholder Groups in Miami, Florida and Charleston, South Carolina.

GOAL 4: SUPPORT AND CONDUCT CRITICAL RESEARCH TO INFORM EFFORTS TO REDUCE LEAD EXPOSURES AND RELATED HEALTH RISKS

Problem: Scientific approaches to support EPA and community actions are needed to inform Goals 1, 2, and 3 – including in the areas of lead science assessment, blood lead level modeling, lead hotspot mapping, analysis of environmental information, development of methods to measure bioavailability and bioaccessibility, and drinking water science to inform corrosion control and identification of lead service line and treatment strategies.

EPA ACTIONS:

APPROACH 1: Reduce lead exposures locally with a focus on communities with disparities and promote environmental justice

- **Extend mapping methods to identify lead hotspots in the U.S. for informing targeted actions in disproportionately impacted communities:** The EPA will apply a science-based approach, based on available data and local knowledge, for characterizing areas of the U.S. with regard to lead exposure potential. The EPA will expand mapping capabilities and analyses that can focus on identifying areas with highest co-occurrence of risk factors (e.g., elevated blood lead levels, older housing stock, socio-demographic factors, and environmental lead sources).

- **Identify lead service lines and collect drinking water samples***:* The EPA's Office of Water, ORD, and regional offices will work with municipalities and utilities on solutions-based research designed to implement and evaluate water sampling strategies and approaches for lead service line identification.

- **Quantify and monitor lead and copper in drinking water and assess filter effectiveness:** The ORD will continue to develop sampling strategies and methods to quantify lead in drinking water and enhance the ability of citizen and community scientists to contribute useful data to regulators' decision-making. The ORD will also assess the efficacy of point of use filters for removing lead nanoparticles from drinking water.

APPROACH 2: Reduce lead exposures nationally through protective standards, analytical tools, and outreach

- **Quantify additional benefits from reducing exposures to lead for regulatory impact assessments:** The EPA is developing new analyses to estimate the social benefits of reducing lead exposures. Current practice is to include only effects on children's cognitive

function in economic analysis of EPA policies and programs. However, lead exposure has a variety of other adverse health effects on children and adults, such as attention disorders and cardiovascular morbidity and mortality, that should be considered in the analysis.

- **Conduct multimedia lead modeling and related research to inform regulatory decisions and site assessments:** The ORD will update the software, user guide, and technical support documentation for the *All Ages Lead Model*[31] to incorporate recommendations of the EPA Science Advisory Board. Support will continue for the *Integrated Exposure Uptake Biokinetic (IEUBK) Model* to use environmental lead exposures to estimate risks of children's elevated blood lead. The EPA has awarded grants for "Estimating Children's Soil and Dust Ingestion Rates for Exposure Science" that will support research to address critical life stage-specific exposure factors for exposure modeling.[32] A series of peer-reviewed meta-analyses of existing data and publications on soil and dust ingestion will be conducted to inform parameters in models estimating blood lead levels from environmental exposures.

- **Conduct lead bioavailability and isotope research to inform agency actions:** The EPA will work with HUD to continue the ORD analysis of lead content and bioavailability in water, soil, and dust samples from the American Healthy Homes Survey II.[33] The ORD is working Regions 2 and 6 on lead isotope analysis that will help inform identification of environmental lead sources for enforcement, compliance assurance, and risk management. The Agency will advance research methods to immobilize or reduce the bioavailability of lead in soil. The EPA is developing an *in vitro* cell line assay for bioavailability for determining site specific cleanup levels. The ORD will investigate *in situ* remediation methods that immobilize soil lead in place through formation of insoluble lead-mineral complexes. Formation of these complexes can greatly reduce the amount of ingested lead that is taken up into the body. These complexes potentially reduce the amount of soil that needs to be removed and replaced in a site remediation or be used to bind residual lead left in soil after remediation.

- **Evaluate soil-lead and dust-lead relationship for target housing:** The EPA will review the relationship between soil-lead and dust-lead in pre-1978 homes, potentially incorporating data from HUD's American Healthy Homes Survey II and the Lead Integrated Science Assessment.[34] The EPA will use this information to support regulatory actions to reduce and prevent lead exposures.

- **Address lead-based paint definition data needs:** The EPA will address some of the data gaps related to the definition of lead-based paint under TSCA by sponsoring a virtual public meeting and technical conference in 2022. The objectives of the workshop may include

[31] https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=343670
[32] https://www.epa.gov/research-grants/estimating-childrens-soil-and-dust-ingestion-rates-exposure-science
[33] https://www.epa.gov/americaschildrenenvironment/american-healthy-homes-survey-ahhs
[34] https://www.epa.gov/isa/integrated-science-assessment-isa-lead

characterizing the capabilities of field portable XRF and other technologies at lower levels of lead in paint; and identifying opportunities, limitations, and constraints for measurement and detection of low levels of lead in paint.

- **Conduct research to better understand and reduce lead in drinking water***:* The EPA will carry out sampling to identify lead service lines, including innovative detection methods. The EPA also will conduct laboratory and field research, with a focus on mitigation methods to reduce exposure to lead from drinking water. Attention will be focused on treatment and corrosion control strategies to reduce lead in drinking water, including understanding how changes in water treatment practices affect the release of soluble and particulate lead into water; premise plumbing modeling to predict concentrations of lead in single-family and multifamily homes with different plumbing materials, pipe layouts, and usage patterns; and source characterization and assessment to better understand lead release mechanisms and corrosion control effectiveness.

APPROACH 3: Reduce lead exposures with a whole of EPA and whole of government approach

- **Collaborate on science-based mapping efforts to identify lead hotspot locations for informing targeted risk reduction actions:** The EPA will engage with HUD and CDC to improve data mapping for identifying and addressing multimedia lead exposures in underserved communities.

- **Collaborate with HUD and possibly other federal agencies on lead-based paint issues:** The EPA will collaborate with HUD and possibly the Consumer Product Safety Commission, National Institute of Standards and Technology, and the Centers for Disease Control on a virtual public meeting and technical conference regarding lead-based paint definition data needs.

REGIONAL COMMUNITY CASE STUDY: The EPA's research on particulate and soluble lead in drinking water was used to help address elevated lead levels found in the drinking water of University Park, Illinois. The village had changed the source of its drinking water from groundwater to surface water, and the treated surface water had a different water quality (i.e., lower alkalinity and hardness) than did the previously used groundwater. Not long after this change in source water, during compliance sampling for the EPA's Lead and Copper Rule, the system was found to have exceeded the lead action level. Although there are no known lead service lines in the village, there were other sources of lead in the household plumbing, such as leaded solder and brass fixtures.

The community and the state of Illinois reacted rapidly and issued a "Do Not Drink" order for the community; they also reached out to the EPA to ask for assistance in understanding why this exceedance occurred when no lead service lines were present. The Agency conducted a field sampling study in University Park to help identify the cause and mechanisms of elevated lead release. The objective of the sampling was to characterize the form, size, and composition

of lead particles in University Park's drinking water. Samples were sent to the EPA's analytical laboratory to conduct multiple analyses including lead in water concentrations, particle size fractionation, electron microscopy, and diffraction techniques. These analyses showed the types of particles that were being formed in their water and provided insight into the mechanism of lead release which was an important piece of the decisions on how to improve corrosion control treatment for their specific water quality parameters. The EPA's experts also participated in meetings with the community to help explain the scientific data they had collected. This research and technical support helped to inform guidance to the state and village on lead solder corrosion, which has not gotten the same amount of research as lead service line corrosion. The complicated situation at University Park has seen improvements in general lead levels with additional monitoring needed.

CONCLUSION AND NEXT STEPS FOR THE DRAFT LEAD STRATEGY

Implementation of EPA's Lead Strategy will result in the Agency taking more effective and efficient actions to minimize lead exposures with an emphasis on overburdened communities and promote environmental justice. The EPA's enhanced actions will further reduce exposures from lead-based paint, dust, drinking water, soils, and air to all Americans with focused attention on children from families living below the federal poverty level and other groups with disproportionately higher lead exposures. The EPA will take a whole of government approach that uses sound science and technology, all available resources, and regulatory authorities.

The Lead Strategy will be improved through public input and active stakeholder engagement. During the public comment period, the EPA will host listening sessions, engage with communities and organizations with vested interests in addressing lead exposures, and collaborate with federal agencies to identify and incorporate additional opportunities for action. The final Lead Strategy, planned for release in 2022, will include target dates and measures of progress for action milestones and completion. Plans and progress, including opportunities for stakeholder engagement, will be described, and updated at EPA's lead website at www.epa.gov/lead.