Environmental Protection Network

(202) 656-6229
environmentalprotectionnetwork.org
info@environmentalprotectionnetwork.org

EPN Comments on EPA's draft Strategy to Reduce Lead Exposures and Disparities in U.S. Communities

Docket Number: EPA-HQ-OLEM-2021-0762
March 8, 2022

Founded in 2017, the Environmental Protection Network (EPN) harnesses the expertise of more than 550 former Environmental Protection Agency (EPA) career staff and confirmation-level appointees from Democratic and Republican administrations to provide the unique perspective of former regulators with decades of historical knowledge and subject matter expertise.

EPN has both comments that address overarching issues as well as specific comments tied to the particulars of EPA's Lead Strategy.

Overall, we applaud the holistic approach of the Strategy ("whole of EPA approach"). It is efficient to address issues comprehensively and also more likely to succeed. We also support EPA's commitment to coordinate with other federal, state, and tribal agencies in this endeavor ("whole of government approach"). Integration and collaboration are efficient and more likely to be effective. To support this consolidated approach, we recommend EPA maintain a focus on communities with the greatest exposures while ensuring that: 1) there is no back-sliding for the general population and 2) actions taken to alleviate human exposures in the short-term do not create larger environmental problems later. Together, these elements—"whole of EPA approach" and "whole of government approach"—establish a dual focus on both the high-risk and general population, and consideration that lead contamination is an ecosystem phenomenon; this constitutes Primary Prevention.

Source reduction is necessary to avoid exposing future generations, including controlling new sources and ensuring that remediation efforts do not simply transfer lead from one environmental medium to another. Municipal incineration, sludge application, leaded-paint abatement, and similar activities can redistribute lead throughout the environment; they must be controlled to minimize future exposures. Targeted childhood blood lead screening of vulnerable children coupled with source reduction will reduce exposures and monitor progress of lead abatement programs.

US lead production and consumption continue to increase.[1] This relates mostly to more starting, lighting, and ignition (SLI) lead-acid storage batteries. EPA should also consider using its authority under the Toxic Substances Control Act (TSCA) to prevent new uses and applications of lead and to strengthen controls on environmental releases that are currently inadequately controlled, such as leaded ammunition, airplane fuel, imported goods, processed food (especially baby food), etc.

We have identified some inconsistencies and gaps in the Strategy. First, child-occupied facilities (COFs) can be sources of lead exposure for children through multiple pathways including paint, drinking water, soil, and interior and exterior dust. These facilities must be evaluated holistically to avoid both media transfer of lead and inconsistent or suboptimal compliance with environmental standards. For instance, EPA's Renovation

---

[1] US Geological Survey. Lead Statistics and Information. Available at https://www.usgs.gov/centers/national-minerals-information-center/lead-statistics-and-information. Accessed 1/6/2022.

Repair and Painting Rule (RRP) should constitute a best management practice in COFs. Also, the drinking water standard in schools should be the most stringent of EPA's drinking water standards, not the most lax. The current Lead and Copper Rule Revision (LCRR) has a "Trigger" of 10 ppb. While we have argued elsewhere that EPA should consider revising the Action Level to 10 ppb and eliminating the Trigger, at minimum EPA should set the school standard to 10 ppb and not the current 20 ppb.

There is a maxim in public health that the perfect is often the enemy of the good. A "lead safe" environment does not mean that it is "lead free." EPA should consider such trade-offs, for instance, in setting soil and dust standards for lead: residential standards can differ from industrial standards. Secondary prevention, used explicitly to remediate specific temporary or crisis risks, can be the most efficient way to protect public health.

DRINKING WATER

Objective B of Goal 1 in the Strategy focuses on reducing exposure to lead from drinking water. EPA first promulgated a drinking water standard in 1991 that required corrosion control treatment for all public water systems (PWS) whenever lead exceeded an action level of 15 ppb in more than 10% of samples. Primacy states were required to monitor and oversee water system actions and, where appropriate, initiate enforcement actions to compel compliance. PWS were required to monitor their distribution lines where lead was expected to occur and report the results and exceedances to EPA and primacy states. Exceedances, any state actions, and all violations were to be reported to the Safe Drinking Water Informations System.

EPA announced on December 9, 2021, its decision to make the LCRR, promulgated on January 15, 2021, effective on December 16, 2021, with a promise that EPA would issue guidance to support implementation. In addition, EPA would:

- Begin development of a new lead and copper regulation to address the many issues raised during EPA's year-long review of the LCRR and its implementation.

- Issue the 2022 $2.9 billion in Bipartisan Infrastructure Law funding, which is the first of five allotments that will provide $15 billion in dedicated funding for lead service line replacement.

EPN recommends that EPA make the following revisions to Objective B:

- On page 10, the problem statement and EPA actions need to be revised to add a new second paragraph that explicitly recognizes that LCR implementation has suffered from ineffective monitoring, poor tracking and oversight of monitoring results, and lead exceedances. Corrosion control treatment where lead exceedances occur has not been uniformly implemented, and EPA and state followup has been inconsistent. A shift to more effective tracking, compliance, and enforcement would address many concerns about the 1991 rule.

- On page 11, both points 1 and 2 of Approach 1 need to be modified. For point 1 on targeting high lead levels, language should be added requesting that PWS revise their existing monitoring plans to better target locations where lead is likely to be. The new monitoring plans should include a provision for technical assistance and focus on disadvantaged communities. For point 2 on use of state revolving fund loans, provide better direction and guidance on selecting PWS for priority funding and better tracking on whether small and underserved and communities of color are addressed.
- On page 12, strengthen Approach 2 to address the major challenges of implementing the LCRR.

The LCRR is not clear about which provisions are enforceable. First, ensure that proper attention is given to more effective installation and implementation of corrosion control treatment. Second, describe how and when tracking and reporting results of monitoring can be more effective and how and when state oversight of compliance and enforcement will be incorporated into the strategy. Finally, address how EPA will work with the Association of State Drinking Water Administrators (ASDWA) and others to better address if, how, and when the state should oversee PWS actions (state primacy assumption).

Lead Pipe Removal and Environmental Justice Communities

The LCRR requires water systems to comply with all provisions of the rule no later than three years after the effective date of the rule. Any time during that three-year period, a water system can choose to comply with the new requirement that utilities must replace the water system-owned portion of lead service lines when a customer chooses to replace their customer-owned portion of the line. This new requirement is designed to prevent partial line replacement, which is known to increase lead in drinking water for days or even months afterwards. While prevention of partial line replacement is critical for public health protection, this new requirement may have the unintended effect of focusing lead line replacement away from disadvantaged communities whose residents are unable to pay to replace their portion of the lines. The new LCRR requirement automatically puts communities where residents choose to pay for replacement at the top of the queue for lead line replacement. The LCRR sets short deadlines for water systems to respond to customer-initiated replacements and requires that water systems certify annually that they have completed all customer-initiated lead service line replacements. Before water systems begin implementing this provision, EPA must focus on ensuring justice in the allocation of resources for lead pipe removal. EPA has $25M in FY2022 grants for small disadvantaged communities to replace lead service lines under the Water Infrastructure Improvements for the Nation Act. EPN recommends EPA use this $25M to pay for private line replacement in high-risk communities where residents cannot afford to pay replacement costs. Once the LCRR provision becomes effective, water systems will be required to replace their portion of the lead lines in these communities.

Planned New Lead and Copper Rule

The final LCRR did not resolve concerns about differing Action Levels for schools vs public water supplies or the new Trigger Level, the reduction in the rate of lead-pipe replacement from 7%/year to 3%/year, nor the 3-year delay in lead-pipe replacement by water supplies. EPN recommends that EPA commit in the lead strategy that these issues will be addressed in the new LCR currently being developed. The lead strategy should also reference the new studies cited below that demonstrate adverse effects from low lead levels in drinking water.

Drinking Water Exposure Studies

Lead poisoning of children due to drinking water has been documented throughout the US, not only by water systems that exceed the LCR but also by many that don't.[2,3,4,5,6] EPA acknowledges that water lead exposures can range from 5% to over 50% of total lead exposures in children and can exceed 85% in formula-fed infants.[7] Subsequent modeling by EPA has demonstrated that water can routinely constitute 80% of US children's lead exposures.[8,9]

Adults also are detectably and quantifiably impacted by lead in US drinking water. Four studies addressing four different specific and direct health outcomes demonstrate that even water at the generally low lead-levels of US public drinking water systems has detectable adverse effects. Danziger *et al* found that the low levels of lead that are commonly encountered in community water systems throughout the US are associated with lower hemoglobin levels and higher drug dosage among patients with advanced kidney disease (dialysis patients).[10] Using general population data, Mulhern *et al* show that 10% of water samples exceeding 2 ppb of lead in the most recent year prior to the blood test was the most important water system predictor of blood lead Levels (BLLs) and increased the risk of BLLs ≥2 µg/dL by 42%.[11] Lu *et al* found an association between the annual fluctuation of water lead levels (WLLs) and math test scores in Massachusetts school districts, after adjusting for confounding by urbanicity, race, socioeconomic factors, school district, grade, and year.[12] Finally, Gibson *et al*, linking through exposure to unregulated private water wells with higher WLLs, found that those relying on private wells had a higher risk of being reported for delinquency after age 14.[13] These four specific studies reinforce the modeling efforts of Stanek *et al* that US

---

[2] Hanna-Attisha M, LaChance J, Sadler RC, Champney Schnepp A. Elevated blood lead levels in children associated with the Flint drinking water crisis: a spatial analysis of risk and public health response. American journal of public health. 2016 Feb;106(2):283-90.

[3] Edwards M, Triantafyllidou S, Best D. Elevated blood lead in young children due to lead-contaminated drinking water: Washington, DC, 2001− 2004. Environmental science & technology. 2009 Mar 1;43(5):1618-23.

[4] Brown MJ, Raymond J, Homa D, Kennedy C, Sinks T. Association between children's blood lead levels, lead service lines, and water disinfection, Washington, DC, 1998–2006. Environmental research. 2011 Jan 1;111(1):67-74.

[5] Triantafyllidou S, Parks J, Edwards M. Lead particles in potable water. Journal‐American Water Works Association. 2007 Jun;99(6):107-17.

[6] Renner, Rebecca. "Out of plumb: when water treatment causes lead contamination." Environmental health Perspectives 117 (2009): A542-A547.

[7] US EPA. 1991. Safe Drinking Water Act, National Contaminant Level Goals, and National Primary Drinking Water Regulations for Lead and Copper (LCR). *Federal Register* 56 (1991): 26460-26564.

[8] Stanek LW, Xue J, Lay CR, Helm EC, Schock M, Lytle DA, Speth TF, Zartarian VG. Modeled impacts of drinking water Pb reduction scenarios on children's exposures and blood lead levels. Environmental Science & Technology. 2020 Jul 8;54(15):9474-82.

[9] Levin R, Vieira CL, Rosenbaum MH, Bischoff K, Mordarski DC, Brown MJ. The urban lead (Pb) burden in humans, animals and the natural environment. Environmental research. 2021 Feb 1;193:110377.

[10] Danziger J, Mukamal KJ, Weinhandl E. Associations of Community Water Lead Concentrations with Hemoglobin Concentrations and Erythropoietin-Stimulating Agent Use among Patients with Advanced CKD. J Am Soc Nephrol. 2021 Oct;32(10):2425-2434. doi: 10.1681/ASN.2020091281.

[11] Mulhern R, Roostaei J, Schwetschenau S, Pruthi T, Campbell C, Gibson JM, A new approach to a legacy concern: Evaluating machine-learned Bayesian networks to predict childhood lead exposure risk from community water systems. Environmental Research, 2022, 204:112146 https://doi.org/10.1016/j.envres.2021.112146. https://www.sciencedirect.com/science/article/pii/S001393512101447X

[12] Lu W, Levin R, Schwartz J. 2022. Lead contamination of public drinking water and academic achievements among children in Massachusetts: a panel study. https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-12474-1

[13] Gibson, J. M., MacDonald, J. M., Fisher, M., Chen, X., Pawlick, A., & Cook, P. J. (2022). Early-Life Lead Exposure from Private Well Water Increases Juvenile Delinquency Risk Among US Teens. scholarworks.iu.edu PNAS 2022 Vol. 119 No. 6 e2110694119. https://doi.org/10.1073/pnas.2110694119

drinking water lead-exposures are likely underestimated.[8] Clearly, the strongest action EPA can undertake to reduce both general population and highly-exposed communities is to reduce lead exposures from public drinking water.

SUPERFUND LEAD CLEANUPS

Lead is a common contaminant at Superfund sites across the country. EPA cleanups have been designed to limit the risk that children will have blood lead concentrations above 10 ug/dL. To determine the soil cleanup level at individual Superfund sites, EPA uses site-specific data with two different models to estimate the concentration of lead in the blood of children, pregnant women, and their developing fetuses who might be exposed to lead-contaminated soil. As the Centers for Disease Control and Prevention (CDC) has recently lowered the blood lead reference value of 10 ug/dL to 3.5 ug/dL, EPN recommends that EPA commit to revising the Superfund cleanup guidance as described below.

- The 20+ year old Office of Land and Emergency Management (OLEM)/Office of Solid Waste and Emergency Response (OSWER) cleanup guidance for lead in soils needs to be updated. Also, there is an accompanying handbook—Superfund Lead Residential Sites Handbook (2003)—which also needs to be updated. See https://semspub.epa.gov/work/HQ/175343.pdf

- There is a 2016 memorandum signed by the Assistant Administrator (AA) for OLEM that de facto changes portions of the prior OLEM/OSWER guidance. Notably it sets a range for Blood Lead Levels (BLLs) of 2-8 ug/dL. This policy memorandum has been often ignored, but it is still on the books. This conflict needs to be resolved based on CDC's new blood lead reference value of 3.5 ug/dL. See https://semspub.epa.gov/work/08/1884174.pdf

- Many states still have a 400 ppm lead in soil cleanup goal that is based on the blood lead reference value of 10 ug/dl. There is an EPA spreadsheet that has all state lead cleanup levels. A handful did follow suit when the CDC lowered its values from 10 ug/dL to 5 ug/dL back in 2012, but the vast majority are still at 400 ppm or higher. Assuming EPA does lower its cleanup goal, EPA must work with the states to encourage them to adopt EPA's lower cleanup goal.

- Currently, there is some ambiguity and inconsistency when and where the Superfund Emergency Response removal authorities are to be used to address lead contamination. It varies across the EPA regions. EPA should commit to issuing a policy memorandum on the need for national consistency.

- The toughest policy call facing EPA is reevaluating previously remediated Superfund sites. It is generally a question of whether to remediate additional lead-contaminated properties rather than previously remediated ones. Remedy reviews by and large show that the remediated properties present little to no exposure risk.

If reevaluation focuses on BLLs only, obtaining representative community data will be a challenge as the old target level based on 400 ppm of 10 ug/dL is no longer appropriate. When BLL data are available, a measure of central tendency (i.e., mean, median, geometric mean) greater than 3.5 ug/dL and less than 10 ug/dL is problematic.

According to recent estimates done by Office of Superfund Remediation and Technology Innovation (OSRTI), if OLEM decides to focus on soil numbers only,, this could result in approximately 500,000 parcels (an order of magnitude estimate) needing investigation and/or cleanup based upon a 3.5 ug/dL BLL using the current Integrated Exposure Uptake Biokinetic (IEUBK) model. The model derived a soil cleanup level between 150 to 200 ppm.

We recommend that OLEM use a combination of the approaches as a guide to reevaluate past sites when performing 5-year reviews. Additional cleanup work at sites that have already been completed might not result in any significant health benefits.

MODELS OF LEAD EXPOSURE

EPN applauds EPA's draft plans to: 1) revise the soil lead policy for contaminated sites; 2) focus on communities with the greatest exposure; 3) address all sources of lead exposure at pilot sites; 4) update models of lead exposure; and 5) conduct lead bioavailability studies in water, soil, and dust. All these elements are needed to improve soil cleanups conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA) authorities.

EPA has historically used the IEUBK model to estimate the distribution of BLLs in children ages 0 to 7 years. The IEUBK model does this by summing the daily intake of lead by children across all media, applying media-specific absorption rates to predict the long-term steady state geometric mean BLL, and then estimating the distribution of BLLs based on geometric standard deviation. In May 2021, the IEUBK was updated to include new data on dietary lead exposure, drinking water consumption, maternal BLLs, inhalation rates, and soil/dust ingestion rates.

EPN recognizes that the IEUBK model has recently been improved and that remediation programs have historically used this model alone to determine soil cleanup levels. EPN recommends that the remediation programs do a sensitivity analysis to compare the predicted distribution of BLLs in children using the IEUBK model alone with the predicted distribution using the Stochastic Human Exposure and Dose Simulation (SHEDS)-Multimedia 3 model coupled with the IEUBK model. These coupled models were peer-reviewed in June 2017[14] and may provide better predictions. The SHEDS model takes the place of the exposure and variability components of the IEUBK model by generating a probability distribution of lead intakes across media. These intakes are multiplied by route-specific (inhalation, ingestion) absorption fractions to obtain a distribution of lead uptakes. These uptakes replace the uptake estimates that would occur within the IEUBK model if used alone. Media-specific uptakes are summed across exposure routes to estimate the total lead uptake per day. IEUBK age-based regression analyses are then used to predict the distribution of BLLs from lead uptake.

EPN further recommends that EPA investigate whether the SHEDS model adequately reflects fence-line community exposures and the bioavailability of lead in various media. SHEDS estimates the distribution of lead exposures using a two-stage Monte Carlo sampling process given input lead concentrations in various media and human behavior data from the Consolidated Human Activity Database (CHAD) and CDC's National Health and Nutrition Examination Survey. CHAD includes detailed data on 22 separate exposure

[14] https://www.epa.gov/sites/default/files/2017-01/documents/report_proposed_modeling_approaches_for_a_health_based_benchmark_for_lead_in_drinking_water_final_0.pdf

and time-use studies done in Baltimore; Cincinnati; Detroit; Denver; Los Angeles; Seattle; Washington, D.C.; Anchorage; and California. EPA needs to determine if these studies appropriately include the differing lead levels in soil from legacy lead in paint and gasoline as well as from industrial sources of lead. A recent study found legacy lead to be a major contributor to contamination of soil.[15]

If these 22 studies are found to inadequately account for fence-line community exposures and the bioavailability of lead, EPN recommends that EPA partner with US Department of Housing and Urban Development (HUD) and other federal agencies to gather the appropriate data.

EPN recommends that the coupled SHEDS Multimedia 3 and IEUBK models be validated for BLLs below 10 ug/dL using data from communities where remediation has been completed. These communities include Bunker Hill, Idaho; Jasper, Utah; Midvale, Utah; and Tar Creek, Oklahoma. In addition, EPN recommends EPA use a One Health approach evaluating both human and ecological data[9] in order to fill critical data gaps.

Finally, serious questions have been raised about the modeling of drinking water as a lead-exposure source.[8,9] Drinking water exposure also needs to be validated.

LEAD PAINT

EPN recommends that EPA make the following revisions to the lead strategy actions regarding lead paint.

- Page 3. There needs to be a discussion inserted before: "The EPA has identified three new approaches that will guide EPA's actions and facilitate greater collaboration within the Agency and with federal partners" that further elaborates the distribution of federal obligations between the following Federal agencies: EPA, HUD, CDC, Occupational Safety and Health Administration, US Consumer Product Safety Commission, and the US Department of Energy (DOE). What would a robust collaboration look like? What data gaps, such as blood lead surveillance data and mapping of lead water lines, need to be filled? Also, what rules need to be upgraded? What specific programs need more resources? In the past, there were quarterly phone calls, which yielded little in coordination. There should also be some discussion on how the recently passed infrastructure funds can be used to eliminate exposure to lead.

Goal 1

Objective A

- Page 7. Chipping paint from windows and porches should be cited as major sources of exposure to lead paint, perhaps at the end of the problem description.

- Page 8, Approach 1. The new energy funding will create opportunities to coordinate with local and state governments and nongovernmental organizations to train workers to go into homes and implement energy efficient measures in environmental justice neighborhoods. There should be opportunities to do cross training with heating, ventilation, and air conditioning and RRP workers to address healthy homes issues such as indoor air and mold. The healthy homes concept should be discussed in this document.

---

[15] Wang, Z. et al., Legacy of anthropogenic lead in urban soils: Co-occurrence with metal(loids) and fallout radionuclides, isotopic fingerprinting, and in vitro bioaccessibility.
https://www.sciencedirect.com/science/article/abs/pii/S0048969721063543?via%3Dihu

- Page 8, Approach 1. The long-term goal of abatement is to permanently eliminate lead-based paint hazards. However, in public health, remediation activities can be phased to maximize risk reduction; examples include interim lead abatement controls with oversight to ensure that conditions do not deteriorate. Updated, health-based dust and soil standards form the basis of good practices.

- Page 9, Approach 2, last bullet. Our understanding of risk exposure and assessment is hampered by the lack of consistent lead blood testing throughout the U.S.[16] Without universal testing, there is no way to truly understand the extent of lead poisoning, nor to truly identify all hotspots within the country. EPA should work with CDC and state health departments to require universal surveillance lead blood testing.

- Page 9, Approach 3, second bullet. Strengthened baby food standards should be an immediate priority for the Food and Drug Administration. In addition, parents would benefit from a web-based resource that identifies all known sources of lead in foods and consumer goods. Ensuring that imported foods and consumer products are not lead-contaminated will require a coordinated "whole of government approach."

- Page 9, Approach 3. Currently there is no national organization of state lead (Pb) health agencies in the U.S. Other EPA regulatory programs have all benefited from the existence of state associations that meet on a regular basis, compare notes, and share with EPA their problems, issues, and needs. EPA should consider providing start-up funding to create a self-perpetuating organization.

Objective B

- Page 13, Approach 3, first bullet. The Interagency workgroup that addresses lead in drinking water should also address lead paint in homes and schools and especially childcare and home daycare centers.

Objective E

- Page 19, Approach 1, first bullet. EPA needs to make sure that the lead paint enforcement programs are adequately staffed. As of the end of 2019, for example, EPA Region 5 had less than two enforcement officers to cover RRP and TSCA 1018 in 6 states. Furthermore, a notification of work performed needs to be written into the current RRP rule. Without notification, it is very difficult to conduct inspections and find non-paper violations.

- Page 19, Approach 2. EPA should develop an easy app for State health and building inspectors to use to report observed RRP violations and collaborating photos real time to EPA staff.

---

[16] As cited in the Federal Register / Vol. 85, No. 122 / Wednesday, June 24, 2020, state action levels for environmental intervention vary greatly. In eight states (AK, IN, MD, ME, MI, NE, OR, and PA) the action level for an environmental investigation is a blood lead level of 5 µg/dL. Fourteen states (CA, GA, IL, KS, LA, NC, NH, NJ, NV, OH, TX, VT, WA, and WV) and the District of Columbia use an action level of 10 µg/dL. Nineteen states (AL, AZ, CO, DE, FL, HI, IA, ID, KY, MN, MO, MS, NM, NY, RI, SC, UT, VA, and WI) use an action level of 15 µg/dL. Four states (CT, MA, OK, and TN) use an action level of 20 µg/dL or above. Five states (AR, MT, ND, SD, and WY) have no policy recommendation or requirement for the blood lead level at which an environmental investigation should be conducted. EPA should provide support and guidance to local and state lead poisoning prevention programs to lower their action levels.

- Page 19, Approach 2. When EPA revisits the RRP rule, the new rule should include the ability for inspectors to enter residences without permission.

- Page 20, Approach 3. As mentioned before in comments on page 9, identification of hotspot mapping is severely limited by inconsistencies in lead testing not only between states but within states.

- Page 20, Approach 3, second bullet. Collaboration with DOE may be useful in identifying communities in need that are disproportionately impacted.

Goal 2

- Page 22, Approach 1, first bullet. A real weakness in the existing EPA Office of Research and Development study on lead exposure by media is that soils and lead paint dust were lumped together in one category. In order to understand where the greatest lead exposures are, it's imperative that they be separated out.[17]

- Page 22, Approach 1, third bullet. When providing job training, EPA should collaborate with HUD and DOE for training workers in all matters relating to healthy homes.

- Page 23, Approach 3, first bullet. Add DOE to the list of agencies to coordinate with.

Goal 4

- Page 27, Approach 1, first bullet. As mentioned before in comments on page 9 and page 20, identification of hotspot mapping is severely limited by inconsistencies in lead testing not only between states but within states.

- Page 28, Approach 1, first bullet. Any new exposure and risk assessments should not only separate out lead paint particles from soil particles (previously discussed), but also include a discussion of lead concentrations in soils in parkways and urban background levels that may exceed health benchmarks.

---

[17] See https://phys.org/news/2021-11-track-sources-contamination-urban-soils.html and Wang *et al* (ref. 15). Wang *et al* also suggests that it may be possible to apportion the sources of Pb poisoning through blood analytical tools and EPA should do more investigation in this area.