CLEAN | public exchange | USC

August 2026

An Issue Brief from CLEAN

The CLEAN Project:
Findings from One Year of Sampling and Analysis

The Contaminant Level Evaluation & Analysis for Neighborhoods (CLEAN) Project is a **free soil testing initiative** that launched in March 2025 with the mission of quickly evaluating and communicating the levels of **lead contamination** in soils following the January 2025 Los Angeles fires. The program is open to anyone in Los Angeles County.

CLEAN participants collect their own samples and submit them by mail or drop them off at one of our community-based drop-off locations.

Learn more about how to participate in the CLEAN project at public-exchange.org/usc/project/soil-testing

In this Report:

CLEAN is supported by: FIRE AID, L.A. Care HEALTH PLAN

What We're Studying

Appendix: Methods

Key Takeaways:

- The fires released lead into the environment, but it can be difficult to distinguish lead deposited by the fires from lead from other sources that has accumulated over decades.
- Lead levels can vary considerably, even within a single property.

That means testing your soil is very important, especially on fire-impacted properties.

The CLEAN team is continuing to analyze soil samples to better understand how the Los Angeles fires affected soil lead levels and and which properties might have been most impacted. We will continue to share findings as they become available.

What CLEAN Does:

Broad lead testing across LA County
Analyzing 6,000 soil samples for lead that residents collected from 3,000 L.A. County properties

Examining burn zone samples over time
Collecting and analyzing roadside dust from the same 32 Altadena locations to see how contamination levels change

Testing soils for other potential fire contaminants
Using multiple methods to analyze a portion of these samples for other metals, like arsenic and chromium(VI)

Post-Fire Environmental Contamination Assessment & Analysis Projects			
Project Name	**CLEAN** *Contamination Level Evaluation & Analysis for Neighborhoods*	**TRACE** *Temporal Resampling and Analysis of Contaminants in the Environment*	**Waters**
Purpose	To communicate to community members the risks of lead contamination on their properties.	To measure how contamination changes over time by repeatedly sampling the same locations in and near the burn zone.	To measure how contamination changes over time by repeatedly sampling the same locations along the Southern California coast.
Geography	All of L.A. County	Select locations in/near the Eaton burn zone	Select locations between Goleta and Tijuana
Substance Tested	Soil	Roadside dust	Seawater and beach sand
Contaminants Tested	Lead, mercury, chromium(VI)	Lead, arsenic	1,500+ chemicals
Samples Collected	6,000+	450+	900+
In this Report	Pages 6 to 14	Pages 4 to 5, Pages 12 to 13	View CLEAN Waters results & analysis at bit.ly/CLEANWaters

CLEAN vs. TRACE: Why do we study both soil and roadside dust?

CLEAN analyzes **soil samples** that Los Angeles County residents collect and submit to help them understand their exposure to lead-related health risks.

Soil contains contaminants that built up over decades. The extent to which a pollution event like the LA fires changes soil lead levels remains to be seen.

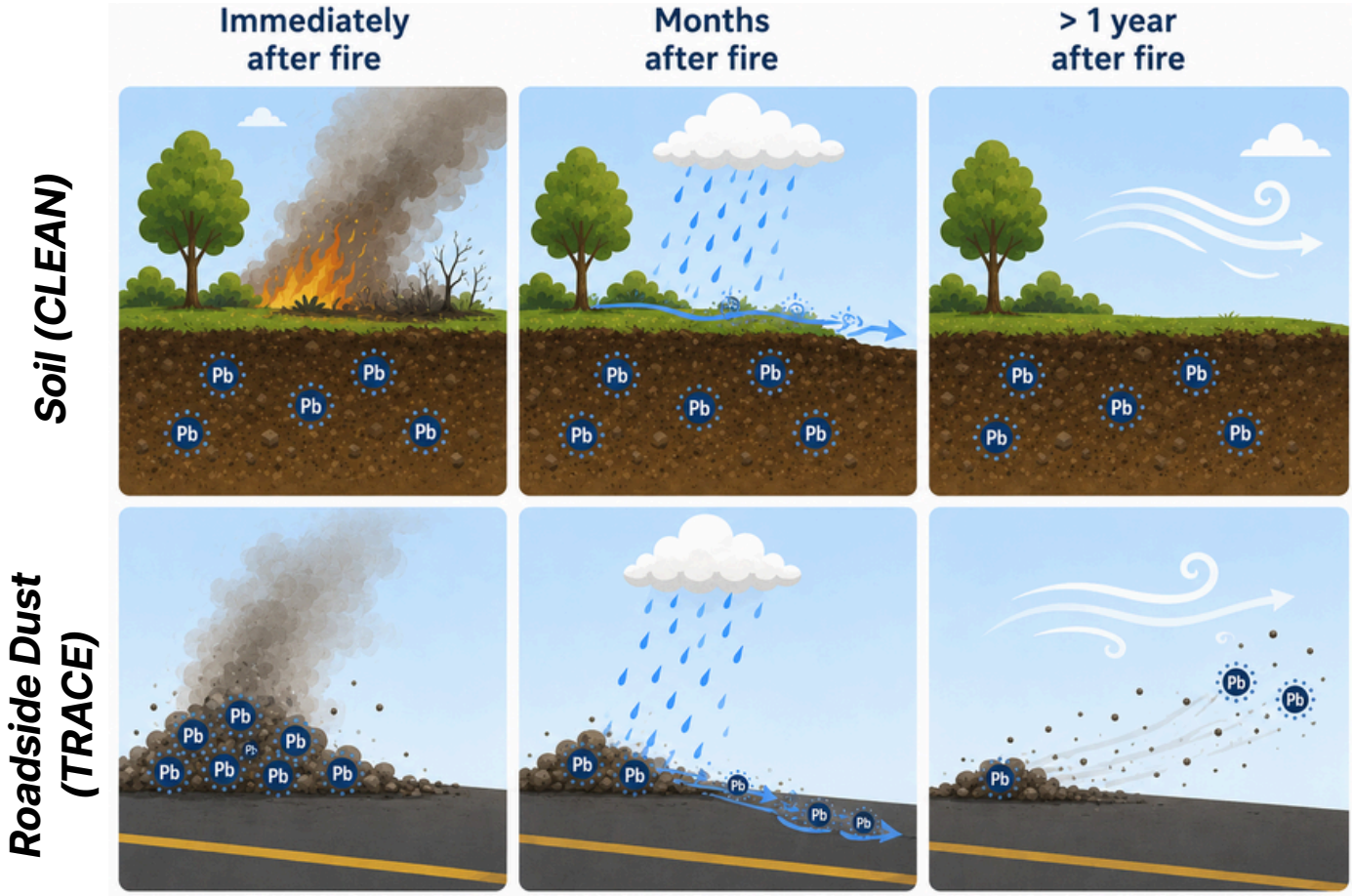
Recent rain or wind is unlikely to affect the overall lead level of the soil. Don't worry if it rained before you collected your CLEAN samples!

The **TRACE Project** looks at **roadside dust** that our research team has repeatedly collected from the same locations in and near the Eaton burn zone to explore how contamination changes with time.

Vehicles, construction activities, and other sources of pollution release particles into the air that settle into a thin layer of dust on the edges of roads. Ash and soot from fires collects in the dust as well.

This dust is constantly changing: rain washes it away, wind blows it elsewhere, and new dust quickly replaces it.

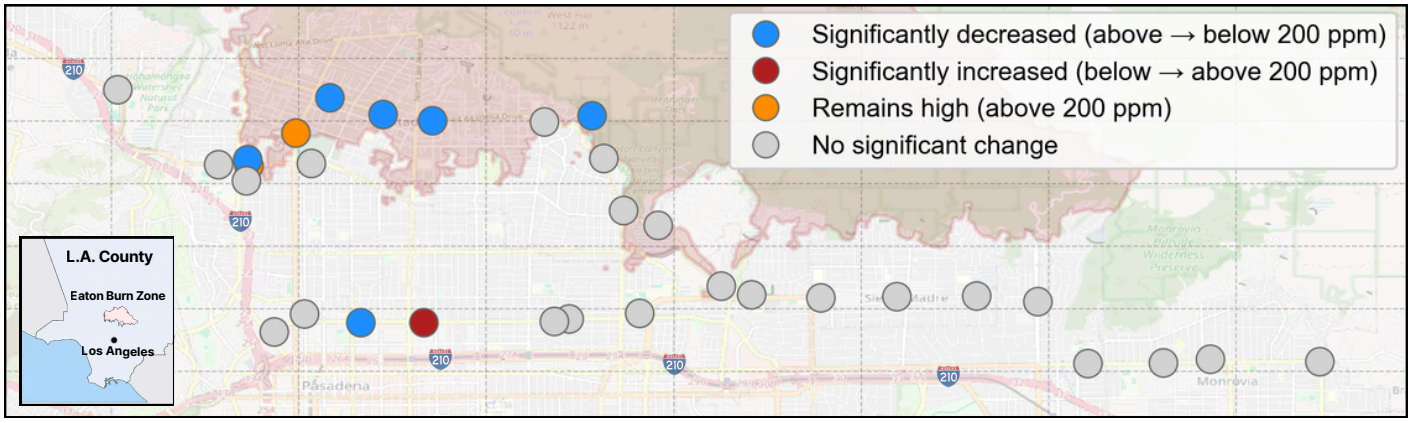
We tested roadside dust to measure the contamination from the LA fires. We test soil to help residents understand the overall lead contamination on their properties—both from the fires and other sources—and their potential exposure to it.



TRACE: Does roadside dust show that the fires released lead into the environment?

The figure below shows the 32 TRACE sampling locations—11 within the burn zone and 21 outside of it—and compares levels of lead in roadside dust collected at those locations in early 2025 to samples collected in early 2026.

Lead concentrations in Altadena TRACE samples relative to 200 ppm
Jan/Feb 2025 vs. Jan/Feb 2026



There is no state or federal screening level for lead in roadside dust, so results in the figure above are reported relative to the US EPA's 200 ppm screening level for lead in residential soils. As discussed on page 9, average lead levels in Altadena are near California's 80 ppm screening level, so we compare lead in Altadena to the US EPA level to make changes more apparent.

Most sites outside the burn zone showed little change (gray), two sites within the burn zone remained above 200 ppm (orange), and several locations within the Eaton burn zone (red shaded area) decreased below 200 ppm (blue). One location outside the burn zone increased above 200 ppm (red).

TRACE detected higher lead in roadside dust within most burn zone locations immediately after the fire, as compared to locations outside the burn zone. This indicates that roadside dust after the fires contained ash and other debris from burned structures, and that **the fires released lead into the environment.**

For a more detailed analysis of lead released by the Eaton Fire into roadside dust, stormwater, and smoke, see CLEAN researchers' June 2026 peer-reviewed study.

Recall:

TRACE studies roadside dust, which provides a snapshot of recent contamination. CLEAN studies soil, which reflects decades of lead contamination from both fire- and non-fire-related sources. TRACE results show that the fires released lead into the environment, but CLEAN shows that lead from the fire is hard to distinguish from lead from other sources.

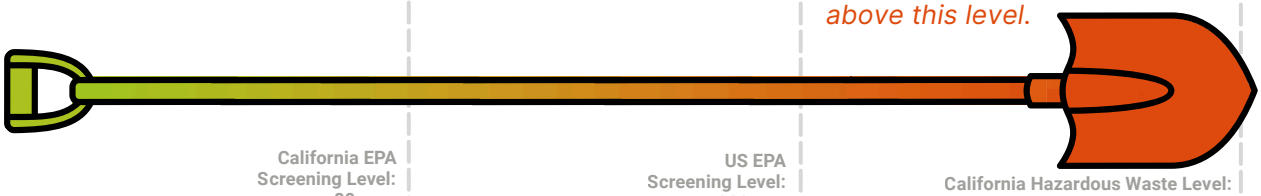
CLEAN Lead Results: March 2025 - July 2026

6,000+ Samples Tested **3,000+** Households Served

61% Below California EPA Screening Level
39% were above this level.

90% Below US EPA Screening Level
10% were above this level.

99% Below CA Hazardous Waste Level
Just 29 samples (0.5%) were above this level.



California EPA Screening Level: 80 ppm

US EPA Screening Level: 200 ppm

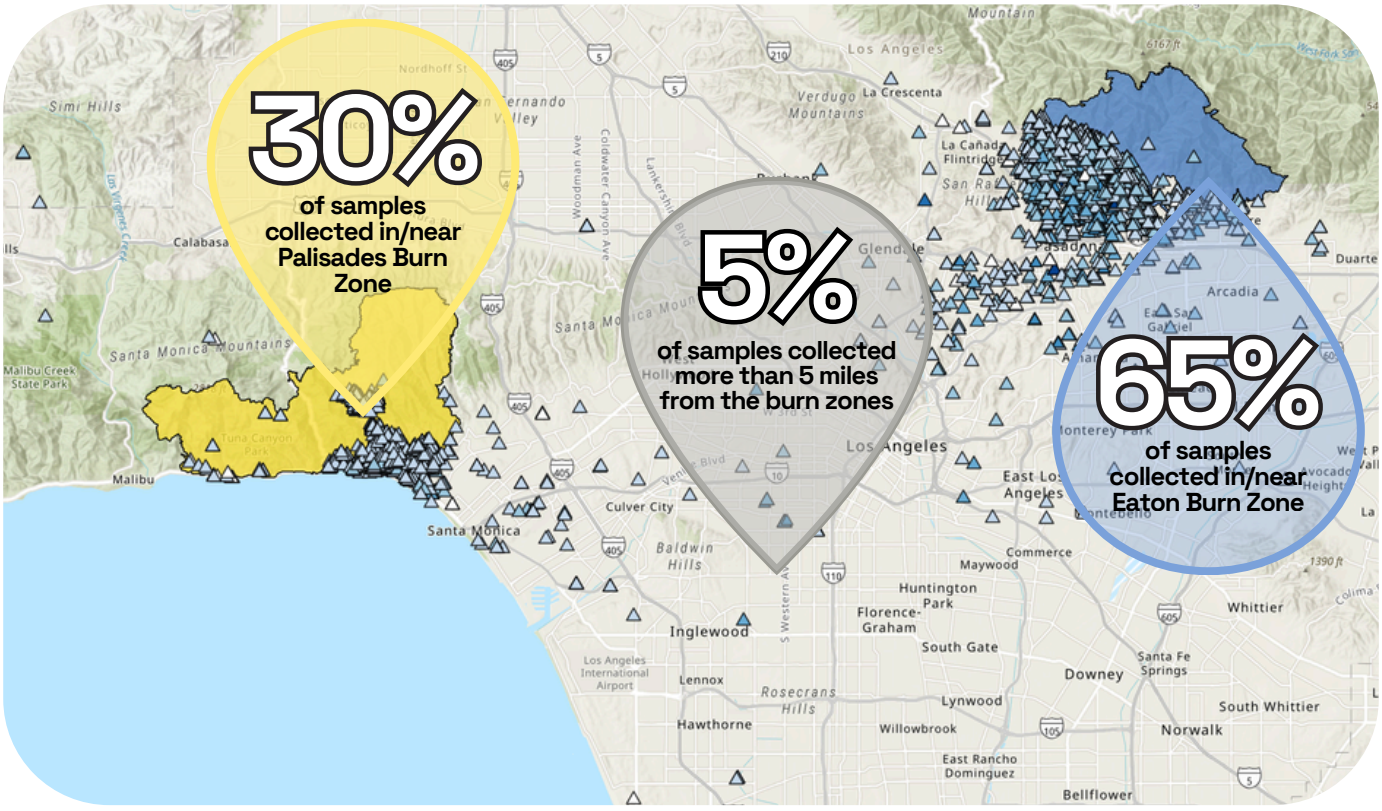
California Hazardous Waste Level: 1000 ppm

ppm: parts per million

CLEAN participants collect their own samples and submit them by mail or at one of our...

6 Conveniently placed soil drop-boxes

- 3 serving Eaton Burn Zone (receiving 67% of samples)
- 2 serving Palisades Burn Zones (receiving 29% of samples)
- 1 serving Boyle Heights (receiving 0.5% of samples)
- Mail-In Samples (4% of samples)



Interactive Map available at bit.ly/CLEANMap.

CLEAN: Why is lead higher in some places than others?

Lead levels can vary widely within a small area—even on the same property.

When two CLEAN samples were collected from different areas within the same property, one commonly contained about **twice as much lead** as the other.

Still, one sample was a good initial indicator of the overall level risk one might be exposed to on a property. In 93% of properties, if one sample was below 80 ppm, the highest lead level recorded anywhere else on the same property did not exceed 200 ppm.

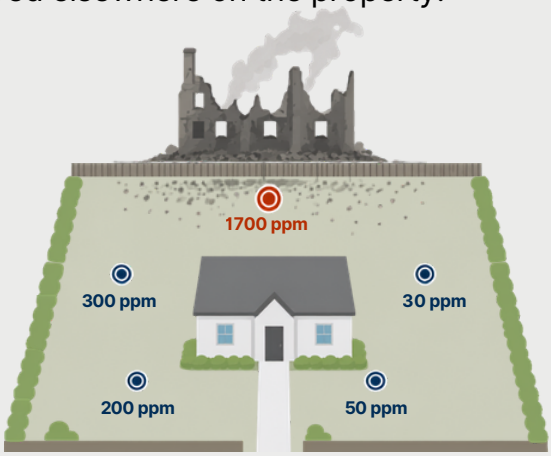
What One Property Revealed About Lead from the Fires

When the CLEAN team finds that a sample has lead levels exceeding California's "hazardous waste" threshold for lead in soils (1,000 ppm), we contact the resident to provide resources and offer other assistance.

In December 2025, we tested a soil sample containing over 1,700 ppm of lead. The resident explained that a historic building—built in the late 1800s and adjacent to their property—had burned during the Eaton Fire, and that ash and debris had fallen into their backyard.

This resident's soil results showed a striking pattern. The sample containing over 1,700 ppm of lead—collected in the backyard where fire debris had fallen—was more than 5x higher in lead than the next highest lead level measured elsewhere on the property.

This property illustrates four important takeaways.



1. Lead contamination can **vary dramatically** over short distances, so a low lead result from one part of a property does not guarantee low lead everywhere else.
2. **Older buildings may be important sources of lead** because they often contain lead-based paint and other lead-containing materials that could have been released during the LA fires.
3. The average (median) level of lead on this property is right around the US EPA screening level of lead in residential soils (200 ppm). Looking at that average, you might not guess that one of the samples from that property had over 1,700 ppm of lead! This property is therefore an excellent example of how localized "hotspots" of fire-related lead can be overlooked when considering **averages** rather than **individual samples.**

CLEAN: Why is lead higher in some places than others?

How does lead get into soil?

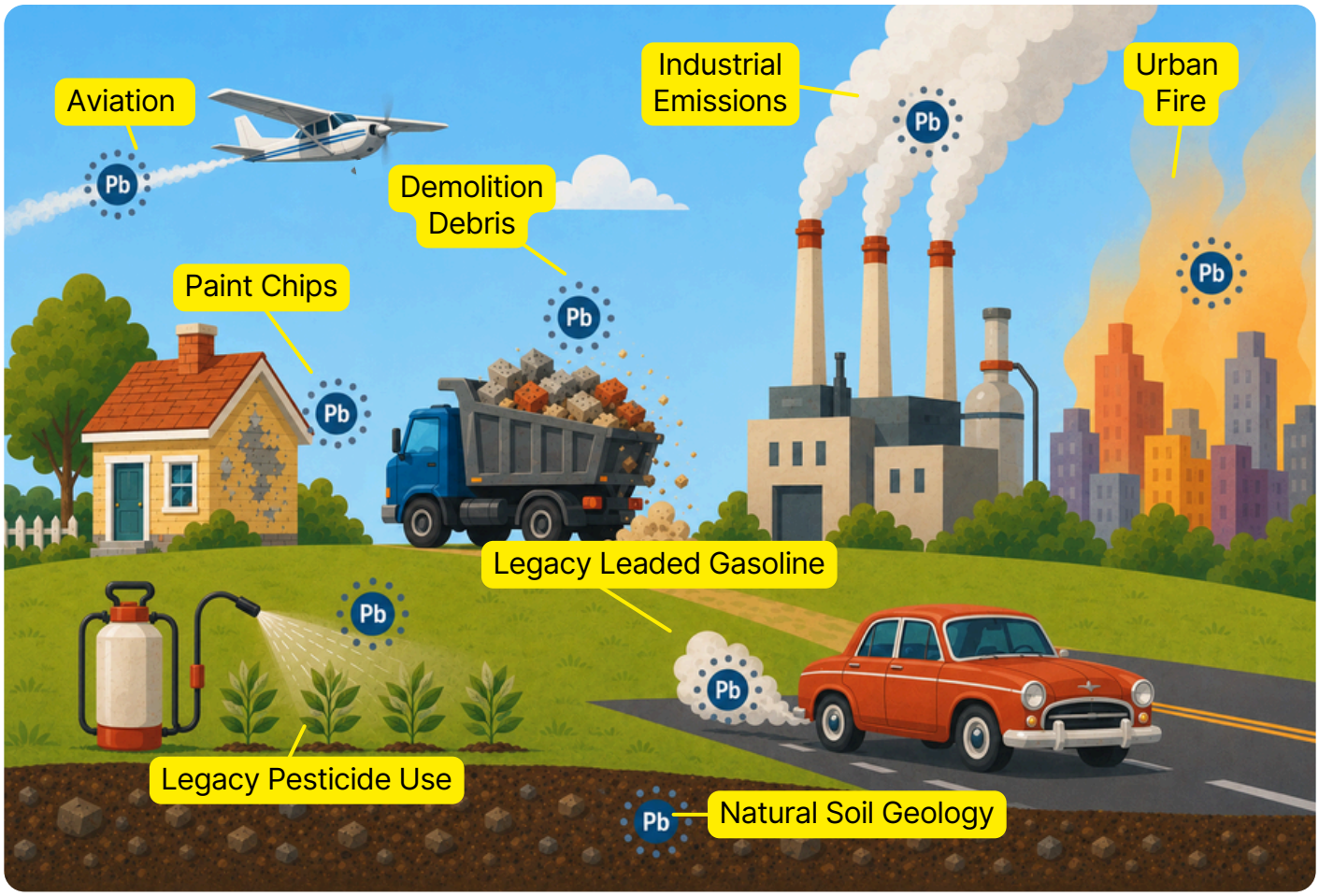
For decades, lead was added to house paint, gasoline, and plumbing. These sources have contributed to a high level of lead in Los Angeles' soils that preceded the fires. Our interpretation guide breaks down research on pre-fire lead levels across L.A.

The image below depicts some of the common sources of lead in outdoor soils. "Legacy lead sources" are lead from past human activities that persists in the environment.

When was lead banned?

Many of these were phased out decades before being banned.

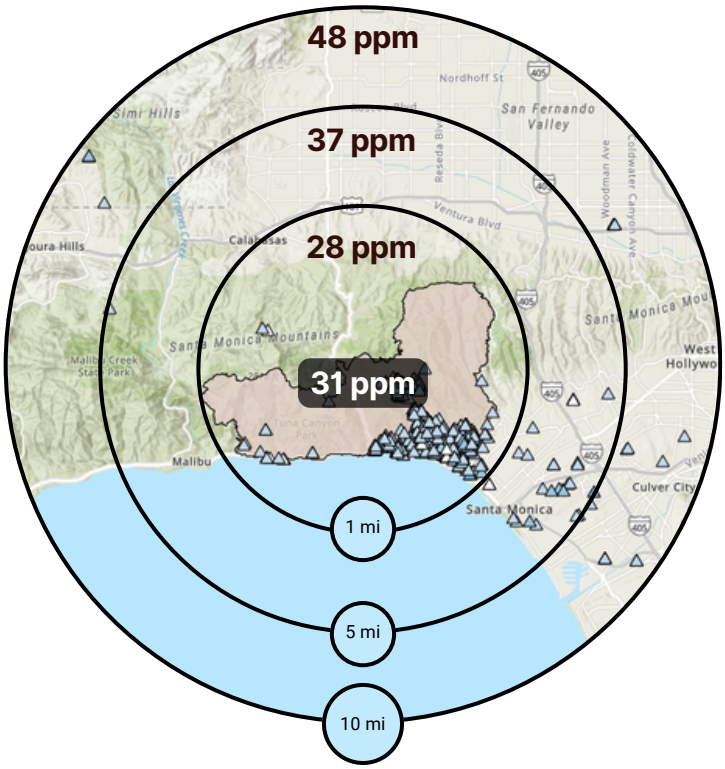
- **1978:** Paint
- **1986:** Plumbing
- **1988:** Pesticides
- **1992:** Gasoline



CLEAN: Is soil lead higher near the burn zones?

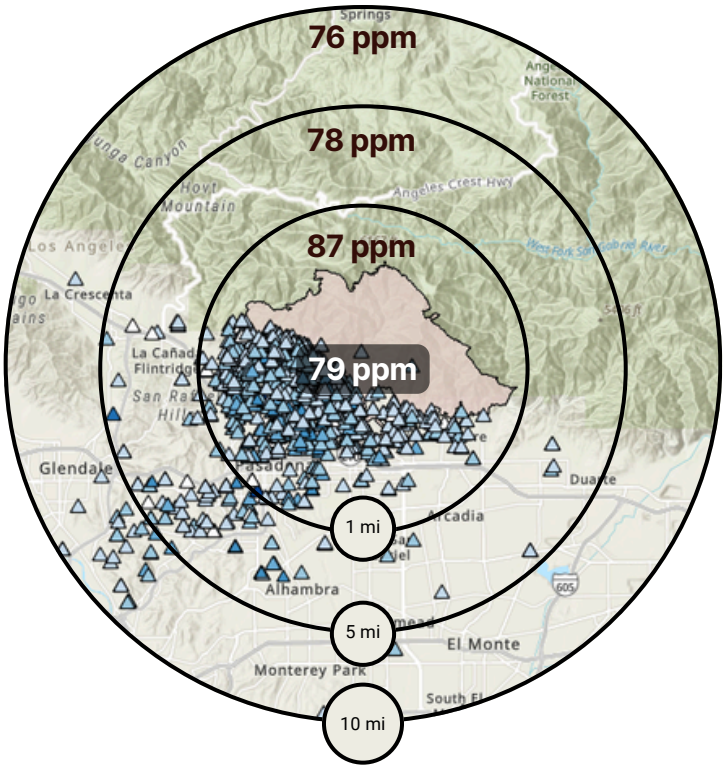
Palisades

On average, lead levels in the burn area—shown in a light red shade in the image on the right—were **31 ppm, well below the CA screening level** (80 ppm). Within 1 mile of the burn area's border, average lead levels were 28 ppm.

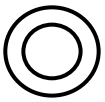


Eaton

On average, lead levels in the burn area—shown in a light red shade in the image on the right—were **79 ppm, almost exactly the CA screening level** (80 ppm). Within 1 mile of the burn area's border, average lead levels were 87 ppm.



Recall:
Overall, 10% of samples exceed the US EPA screening level for lead in residential soils (200 ppm).



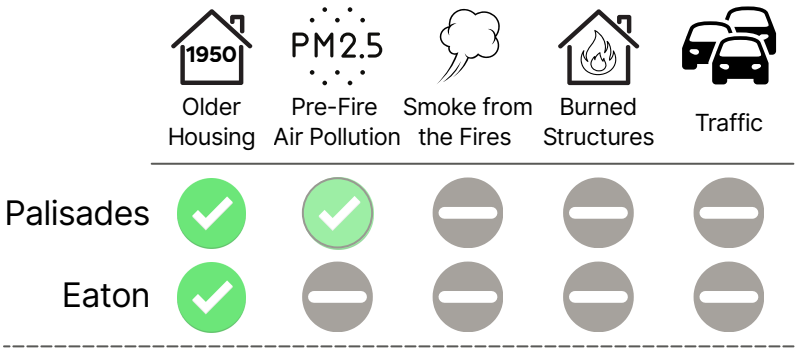
Each concentric ring shows the **median** lead level within that distance from the burn area's border. For example, on the lower image, the median lead concentration among samples collected between 1 and 5 miles from the Eaton burn area is 78 ppm. Distances shown by the rings are approximate.

Each triangle represents a sample submission, with darker blue shades denoting higher levels of lead. See the CLEAN map.

Similar lead levels inside and outside the burn area suggest that non-fire sources of lead are contributing substantially to soil contamination, making the effects of the fires more difficult to distinguish.

CLEAN: What factors were linked to CLEAN soil lead levels?

To better understand what causes elevated soil lead, our team examined whether CLEAN lead results were associated with fire-related factors (**smoke exposure** and **proximity to burned structures**) and non-fire sources of lead (**older housing**, **pre-fire air pollution**, and **traffic**).



Limitations of This Analysis:

- CLEAN's first soil samples were collected in March 2025, when TRACE data showed that lead in roadside dust had already declined.
- This analysis did not account for post-fire remediation/scraping or the extent of fire damage to individual properties.

High lead levels linked to:

- More than 50% of nearby houses built before 1950 (*source*)
- *Palisades only:* Pre-fire air pollution (PM 2.5, *source*)

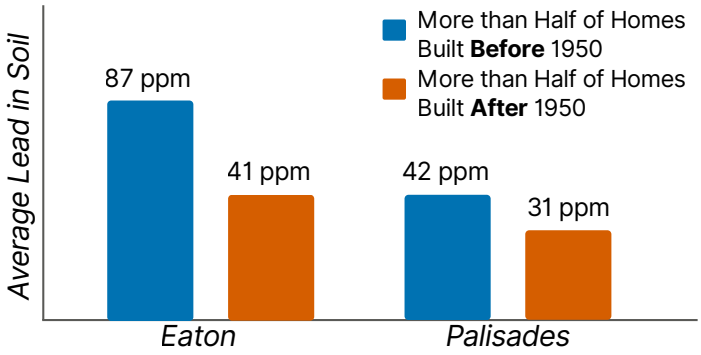
High lead levels **not** linked to :

- Heavy smoke from the fires (Jan 7 to Jan 31, 2025) (*source*)
- More than 50% of nearby structures are fully burned (*source*)
- Heavy nearby traffic (*source*)

After accounting for other factors, we did not see a relationship between fire damage or smoke and higher soil lead levels. But **higher lead *was* linked to older housing.**

Eaton: Lead levels in soil were **twice as high** in neighborhoods where most housing was built before 1950, compared to soil in neighborhoods with newer housing.

Palisades: Lead levels in soil were **about 35% higher** in neighborhoods where most housing was built before 1950, compared to soil in neighborhoods with newer housing.



While we did not see a relationship between high lead levels and areas that experienced prolonged heavy smoke *during* the fires, we did see a weak association between air pollution (PM2.5), as measured *before* the fires, and lead levels in soils in the Palisades. This association might reflect that soil lead increases closer to urban areas, where the air is more polluted.

We know that the fires were a major pollution event: over 16,000 structures burned in the fires, as well as cars, batteries, and other materials containing heavy metals like lead. Indeed, TRACE roadside dust samples do reflect that the fires released lead into the environment.

But L.A. soils are contaminated by multiple sources of lead, and soil is a record of all of these sources. The fires added to that existing contamination, making their contribution difficult to distinguish. CLEAN continues to refine measures of the LA fires to better isolate their impacts.

CLEAN: Is soil lead lower in scraped areas?

In the months after the fires, federal agencies carried out a two-phase cleanup program within the Eaton and Palisades burn zones designed to reduce exposure to hazardous materials and fire-related contamination.

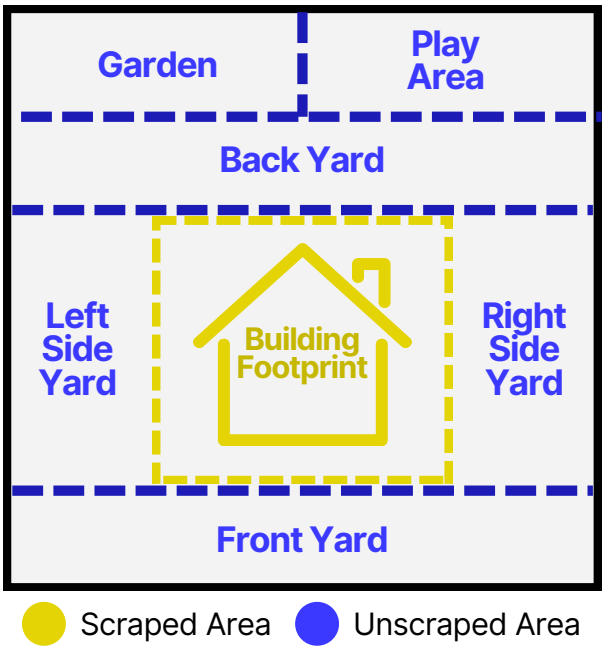
In Phase I, the US EPA removed hazardous household materials (like damaged batteries or propane tanks) from the property.

In Phase II, the US Army Corps of Engineers scraped the top six inches of soil from destroyed **building footprints** and up to 5 feet around those footprints.

We found that, after scraping, lead in soils from footprint samples was about **38% lower** than lead from the surrounding area on the same property.

But we also found that building footprints tended to be lower in lead in general. Footprints in unscraped properties typically had 10% lower lead than other areas on the property—suggesting that soil under buildings may have had lower lead levels even before scraping.

Of note, we found that "hotspots" with higher lead contamination were more likely to be from areas of a property outside of a building footprint than in the footprint itself. So testing is important, even after Phase II scraping!



In a May 2026 study of 100 randomly selected properties in the Eaton burn zone, the US EPA found that lead levels in 98% of scraped building footprints were below the agency's lead screening level (200 ppm).

Limitations of This Analysis

- Because we did not have samples from the same locations both before and after soil scraping, we cannot conclude that soil scraping itself **caused** the lower lead levels.
- We had fewer than 20 samples from beneath standing buildings, so additional data are needed to establish that lead is lower in footprints of unscripted properties.
- These analyses are based on participants' descriptions of where they collected their samples. Because people described locations in different ways, some samples may have been grouped into the wrong category.

TRACE & CLEAN: How severe is arsenic contamination in soils after the fires?

The CLEAN project tests all soil samples for lead, primarily because lead is hazardous to health, especially for children and pregnant people. Moreover, when the Los Angeles County Department of Public Health tested fire-impacted soil in 2025, lead was the contaminant most often found above state screening levels. Read the full report here.

The study also found that **arsenic** was elevated in some places, particularly in the Palisades. But it found higher arsenic outside the burn zone than within it, and stated, "arsenic was determined to be present in concentrations which are consistent with background soils."

Arsenic is a natural element found in rocks, soil and groundwater across California. As a result, some exposure to "background levels" of arsenic is unavoidable—and, at low levels, is **not a high public health concern.** But exposure to **high** levels of arsenic over time can lead to skin lesions, heart disease, diabetes, nerve issues, cognitive impairment, cancer, and other serious health problems. Like lead, children and pregnant people are especially sensitive to arsenic.

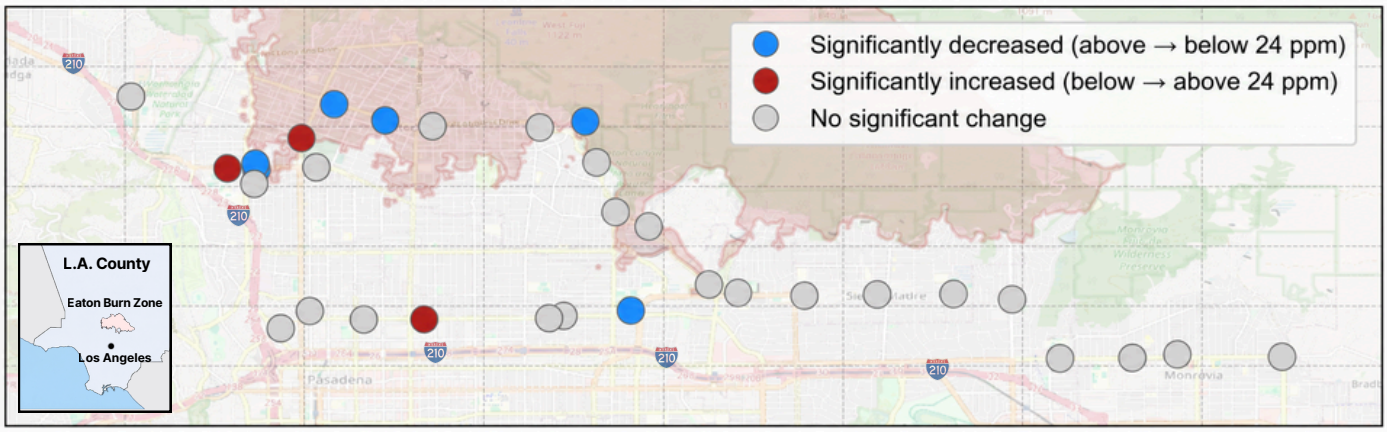
	Arsenic (As)	Lead (Pb)
California EPA Soil Screening Level	12 ppm	80 ppm
Is this level based on the metal's risk to health?	**No** *It represents "background levels"*	Yes
How is this level calculated?	According to a 2020 DTSC study of the soils at 50 schools and other locations across Southern California, "background levels" of arsenic can be up to 12 ppm—but DTSC advises that levels may be higher depending on soil geology.	Based on the amount of lead needed to affect a young child's IQ, assuming daily exposure over multiple months and that most of the lead in the soil is absorbed by the body. These assumptions are designed to be very protective—most people are unlikely to experience this level of exposure. See more.

TRACE & CLEAN: How severe is arsenic contamination in soils after the fires?

TRACE: Arsenic Analysis in the Eaton Burn Zone

Arsenic concentrations in Altadena TRACE samples relative to 24 ppm

Jan/Feb 2025 vs. Jan/Feb 2026



The figure above shows changes in roadside dust **arsenic** concentrations between January–February 2025 and January–February 2026. We selected 24 ppm as our benchmark because arsenic concentrations in Southern California are often near or above California's 12 ppm background level, so comparing arsenic levels to 24 ppm make changes more apparent.

Within the Eaton burn zone (the red shaded area above), most measured arsenic levels stayed the same (grey) or decreased (blue) between early 2025 and early 2026, though some locations saw an increase in arsenic (red).

All arsenic levels detected in roadside dust remained within the range that is generally consistent with background levels.

CLEAN: Arsenic Analysis in the Palisades (Will Rogers State Historic Park)

In November of 2025, CLEAN partnered with Will Rogers State Historic Park to evaluate levels of heavy metals, including arsenic, in soils at 16 locations across the park. Five of the 16 locations exceeded 12 ppm of arsenic, but remained within the range consistent with background levels.

The CLEAN team found no evidence of fire-related arsenic contamination in Will Rogers at levels that would be abnormal for Southern California soils.

The full Will Rogers State Historic Park Report provides findings based on analyses of 16 heavy metals—but only lead and arsenic exceeded the CA EPA screening level.

CLEAN plans to conduct further research into the rocks and soil at the park to better understand how geology impacts background soil arsenic. This work could help CLEAN quantify screening levels for arsenic that are appropriate for the soils in L.A. County.

CLEAN: Do other metals in soils pose widespread risks to public health after the fires?

In the year since the fires, community members have also asked CLEAN to look at mercury and hexavalent chromium. In response to these requests, we report the early results of our mercury and hexavalent chromium testing below.

CLEAN samples that were in high in lead were not more likely to also have high levels of mercury or hexavalent chromium. CLEAN is still investigating the factors leading to elevated levels of mercury and hexavalent chromium.

At this point, mercury and hexavalent chromium in soils do not appear to pose widespread public health risks after the fires. See more below.

Mercury

There are different kinds of mercury, some of which are more dangerous to health than others. Most of the mercury that poses a health risk comes from our diet, especially when we eat certain kinds of fish. Mercury in soil is most likely to be a health concern if present in very high levels.

0.7%
of samples are "concerning"

California has different health-based screening levels for different forms of mercury, but since CLEAN measured total mercury—without analysis of specific forms—there is no single state or federal screening level that can be applied to these results. CLEAN is exploring more detailed testing to identify different forms of mercury. In the meantime, some researchers suggest that total mercury levels above **4.7 ppm** in soil can be dangerous.

Of 300 CLEAN samples with high lead, just 2 had mercury above 4.7 ppm. These measured 5.2 ppm and 5.8 ppm.

Hexavalent Chromium

Hexavalent chromium—chromium(VI) or Cr(VI)—is a toxic form of the metal chromium that has been linked to increased cancer risk and can also irritate the lungs, skin, and digestive system. You might remember it from Erin Brockovich's work exposing groundwater contamination in Hinkley, CA, which was later made into a movie.

Only a small number of CLEAN samples showed detectable Cr(VI), and at this point in time, there is no evidence that fire-affected properties are more likely to have detectable Cr(VI) in their soil.

Cr(VI) Activist Erin Brockovich

Limitations of This Analysis

We collected samples for Cr(VI) analysis in the winter of 2025. As a result, our analyses may not capture any increases in Cr(VI) that occurred immediately after the fires earlier that year.

Conclusions

Our research to date suggests that:

- Within the burn zone, roadside dust—which is more mobile than soil—tended to show higher levels of lead immediately after the fires, followed by a decrease.
- Lead levels can vary considerably, even within the same property.
- Areas with older housing (built before 1950) are more likely to have elevated soil lead levels.
- Elevated lead levels can persist outside building footprints even after Phase II remediation.
- We found no evidence of widespread post-fire contamination from arsenic, mercury, or hexavalent chromium, although additional research is needed.

Overall, while the fires were a major pollution event, in this report, CLEAN finds that:

1. Legacy sources (like the age of nearby houses) also increase lead in the environment, making the effects of the fires on soil lead difficult to estimate.
2. In the majority of samples, the levels of metals were below levels indicating a significant risk to public health. But in some locations, lead levels *did* pose a health risk, so it's important to test!

CLEAN will continue accepting and testing soil samples for lead into 2027 and will report new findings as they become available.

For more on CLEAN, visit public-exchange.org/usc/project/soil-testing/
or contact cleanproject@usc.edu

Other Post-Fire Soil Research to Review

Elevated Environmental Lead Concentrations Following a Major Urban Fire (peer-reviewed article published in June 2026, written by CLEAN faculty and associated students)

LA County Department of Public Health: Roux's Soil and Ash Testing for Metals, PAHs, and Dioxins/Furans

U.S. Environmental Protection Agency: Eaton Soil Confirms Effectiveness of Cleanup Protocols

Community Action Project LA (CAP.LA, from UCLA + LMU): Ongoing Heavy Metals & Cr(VI) Testing

Recommendations

- **Test your property's soil.** Follow the instructions we provide in our sample collection guide to get a sense of how lead levels look across your entire property. Even if you've already participated in CLEAN, feel free to submit samples again!
    - If you live **within 10 miles of the Eaton burn zone**, and/or within a community with a lot of **older homes**, we strongly encourage you to participate in CLEAN, as your property is more likely to have elevated levels of lead in soil.
- **Do not assume that Phase II USACE scraping eliminated all contamination from a property.** The federal cleanup focused primarily on building footprints, so be sure to test for lead elsewhere on your property—particularly in high use areas, like front yards and gardens.
- If your property's lead levels are high, consult the **CONSORTIUM Remediation Guide** (coming soon) for advice on next steps and recommendations for trusted contractors.

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Appendix: Analytical Methods

Page 5: How Lead Levels Have Changed Since the Fires

CLEAN researchers gathered samples of roadside dust from 32 locations in Altadena, both inside the Eaton burn zone and about ¼ mile away from it. Samples were tested using handheld X-Ray Fluorescence (XRF) and analyzed for lead and arsenic.

Page 6: General Patterns of Lead in Soil Across Los Angeles

Residents collected soil samples from locations they chose, following CLEAN sample collection guidelines and providing information about those samples via the CLEAN intake survey. Residents deposited these samples at one of our 6 drop boxes or mailed them to USC. CLEAN researchers tested these samples for lead by XRF.

Pages 7-9: How Lead Levels in Soil Vary by Location

CLEAN results are added to a map and analyzed by location. CLEAN uses medians to represent the average lead level on a property or within a certain distance of the burn zone. We did not account for whether samples were collected from scraped areas (5% of samples) or the extent of fire damage to the property (48% of samples collected from total loss properties).

Page 10: Factors Associated with High Lead in Soil

Researchers used linear mixed-effects models to examine how soil lead levels were associated with fire-related factors (nearby burned structures, heavy fire smoke) and non-fire factors (such as neighborhood age, traffic, and pre-fire air pollution).

Page 11: Lead Levels in Phase II Scraped Soils

Researchers used linear mixed-effects models to compare lead levels between foundation and non-foundation soils and Phase II scraped and non-scraped properties, while accounting for multiple samples collected from the same property using a random effect. Because most Phase II scraping was complete by the beginning of the CLEAN project in March 2025, the researchers assumed all total loss properties to have received Phase II scraping, unless the CLEAN participant had indicated otherwise.

Pages 12-15: Health Risks Associated with Other Heavy Metals

- Arsenic: See “How Lead Levels Have Changed Since the Fires” and Will Rogers State Historic Park Issue Brief.
- Mercury: CLEAN researchers used a Direct Mercury Analyzer (DMA) to measure mercury concentrations in a subset of about 300 CLEAN soil and TRACE roadside dust samples that had previously been identified as having elevated lead concentrations by XRF, and compared mercury concentrations between sample types and with lead concentrations.
- Chromium: In December 2025, CLEAN researchers collected 24 soil samples in the Palisades and immediately placed them into a cold storage box to preserve them. On campus, researchers used EPA Method 3060A to test them for Cr(VI).