

Notre-Dame's Toxic Fallout

 [nytimes.com/interactive/2019/09/14/world/europe/notre-dame-fire-lead.html](https://www.nytimes.com/interactive/2019/09/14/world/europe/notre-dame-fire-lead.html)

By Elia Peltier , James Glanz , Weiwei Cai and Jeremy White

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Flames engulfed 460 tons of lead when Notre-Dame's roof and spire burned, scattering dangerous dust onto the streets and parks of Paris.

PARIS — The April fire that engulfed Notre-Dame contaminated the cathedral site with clouds of toxic dust and exposed nearby schools, day care centers, public parks and other parts of Paris to alarming levels of lead.

The lead came from the cathedral's incinerated roof and spire, and it created a public health threat that stirred increasing anxiety in Paris throughout the summer.

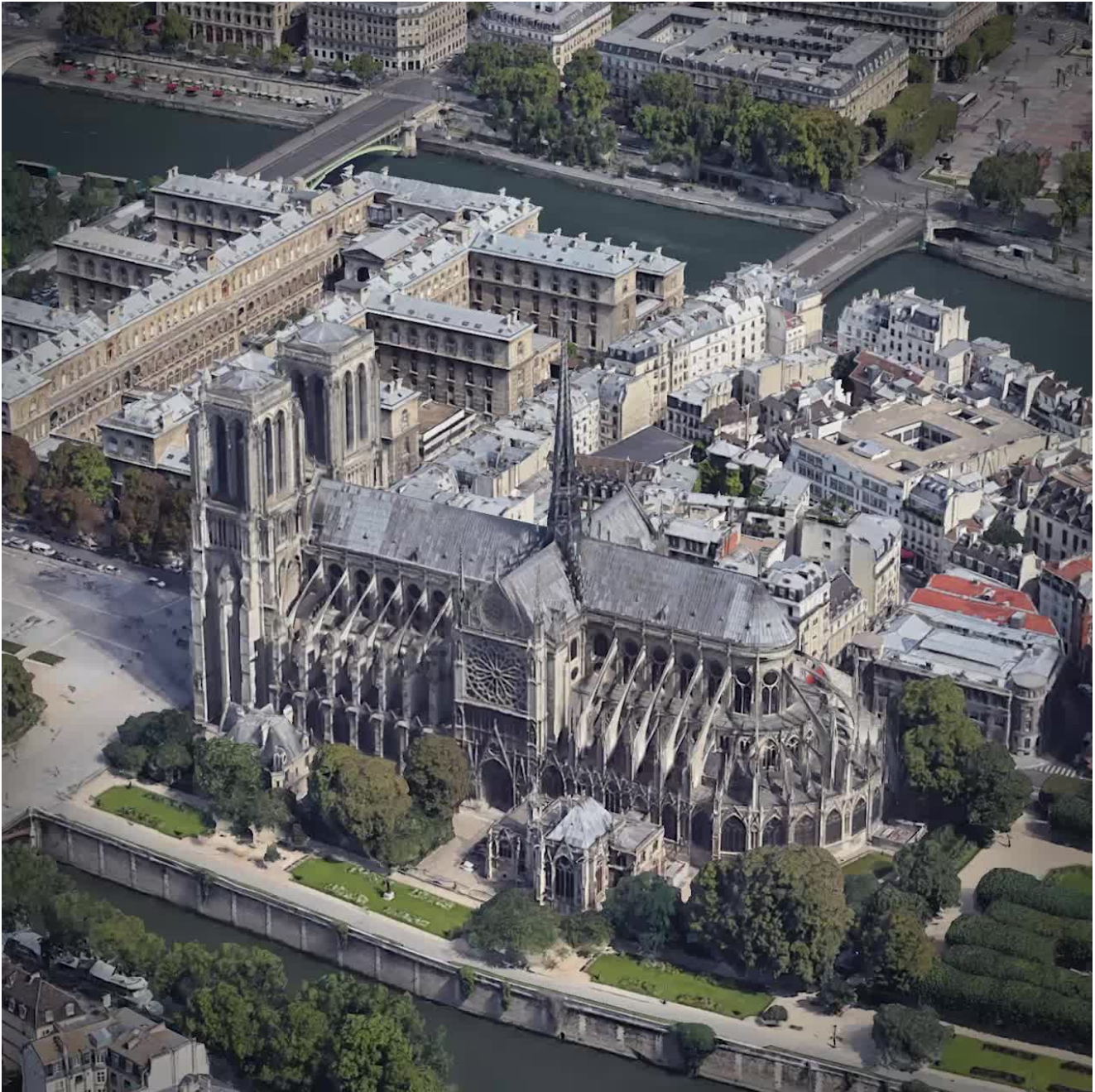
Five months after the fire, the French authorities have refused to fully disclose the results of their testing for lead contamination, sowing public confusion, while issuing reassuring statements intended to play down the risks.

Their delays and denials have opened the authorities to accusations that they put reconstruction of the cathedral — which President Emmanuel Macron has pledged to complete in five years — ahead of the health of thousands of people.

A comprehensive investigation by The New York Times has helped fill out an emerging picture of a failed official response. It found significant lapses by the French authorities in alerting the public to health risks, even as their understanding of the danger became clearer.

The April 15 blaze nearly destroyed the 850-year-old cathedral and brought immediate scrutiny onto whether adequate fire protections had been in place to safeguard a gem of Gothic architecture visited by some 13 million people a year.

Millions around the world watched in horror as the cathedral's roof and spire succumbed to the flames that night and collapsed. But the billowing smoke carried its own hidden danger: massive quantities of lead, according to test results in confidential reports and others released by the government.



As fire raged and the roof collapsed, some of the lead covering the roof and spire was dispersed as dust.

Levels of lead dust deposited near the cathedral were up to 1,300 times higher than French safety guidelines.

The lead spread across central Paris, tests indicate, settling in schools, parks and other public places.

Here are all the places where lead was found above the guideline level of 93 micrograms per square foot cited by some French officials.

Below the guideline Above the guideline

More than 6,000 children younger than age 6 live within a half mile of those locations, a Times analysis found.

The Times's investigation drew on confidential documents, including warnings by labor inspectors, a police report and previously undisclosed lead measurements by the Culture Ministry. Two French news organizations, Mediapart and Le Canard Enchaîné, have also investigated the lead concerns.

The documents, as well as scores of interviews, make clear that the French authorities had indications that lead exposure could be a grave problem within 48 hours of the fire.

But it took a month before city officials conducted the first lead tests at a school close to Notre-Dame. Even today, city and regional health officials have not tested every school in the proximity of the cathedral.

The tests showed levels of lead dust above the French regulatory standard for buildings hosting children in at least 18 day care centers, preschools and primary schools.

In dozens of other public spaces, like plazas and streets, authorities found lead levels up to 60 times over the safety standard. Soil contamination in public parks may be among the biggest concerns.

The highest contamination levels, revealed in the confidential Culture Ministry documents obtained by The Times, were at different spots in, or near, the cathedral site. The authorities failed to clean the entire area in the immediate aftermath of the fire and waited four months to finish a full decontamination of the neighborhood.

Workers wore protective suits during decontamination operations at Notre-Dame this month. Dmitry Kostyukov for The New York Times

The Culture Ministry, which is responsible for cleaning the site and rebuilding Notre-Dame, also failed or refused to enforce safety procedures for workers, leaving them exposed to lead levels more than a thousand times the accepted standard.

"These are astronomical levels, and the attitude of health authorities is inexplicable," said Annie Thébaud-Mony, a prominent public health expert in France, who has been leading public calls for more transparency in the aftermath of the fire.

The lead levels were concerning enough that some health experts consulted by The Times advised against taking small children near Notre-Dame, though all agreed it was safe to visit Paris.

Some French officials and lead experts have cautioned against "paranoia" and argued that in a city as old as Paris, not all of the high lead levels can be attributed to the Notre-Dame fire. The test results may in part reflect broader underlying problems with lead contamination in Paris.

What We Found About Notre-Dame's Lead, and What It May Mean for You

Lead exposure poses the greatest risk to children, especially under age 6, as well as to pregnant women and nursing mothers, who can pass lead on to their children.

If ingested, lead interferes with the normal development of the nervous system and can leave young children with permanent cognitive damage, producing problems that range from the loss of a few I.Q. points to difficulties with reading and a tendency toward aggressive behavior.

Even so, hundreds of children attended schools near Notre-Dame for weeks before the authorities began in mid-May to test for lead levels, or to clean the buildings.

The Saint-André des Arts primary school is one of the schools where the highest levels of lead were found. Dmitry Kostyukov for The New York Times

"It's almost a no-brainer that if you incinerate hundreds of tons of lead, you're going to have some significant deposition of particles in the neighborhood," said Matthew J. Chachère, the longtime counsel to the New York City Coalition to End Lead Poisoning.

"I would think there would have been sufficient knowledge among public health authorities to realize that this had the potential to cause a great deal of environmental harm," Mr. Chachère said.

Notre-Dame is a unique structure in France, and in the aftermath of the fire, the official response was divided between city, regional and national officials. Each had distinct responsibilities, and sometimes competing interests, as lines of authority collided, undermining accountability.

Debris inside the cathedral. Pool photo by Stéphane de Sakutin

City officials, who didn't order lead testing until a month after the fire, said they had wanted to communicate more openly with the public but were following the lead of regional and national agencies.

"The state was afraid to make people afraid," said Anne Souyris, the city's deputy mayor in charge of health, who also noted that officials were faced with a singular disaster that left them struggling to navigate regulatory vagaries.

"They thought that they would protect people by not communicating about the lead issue," she said

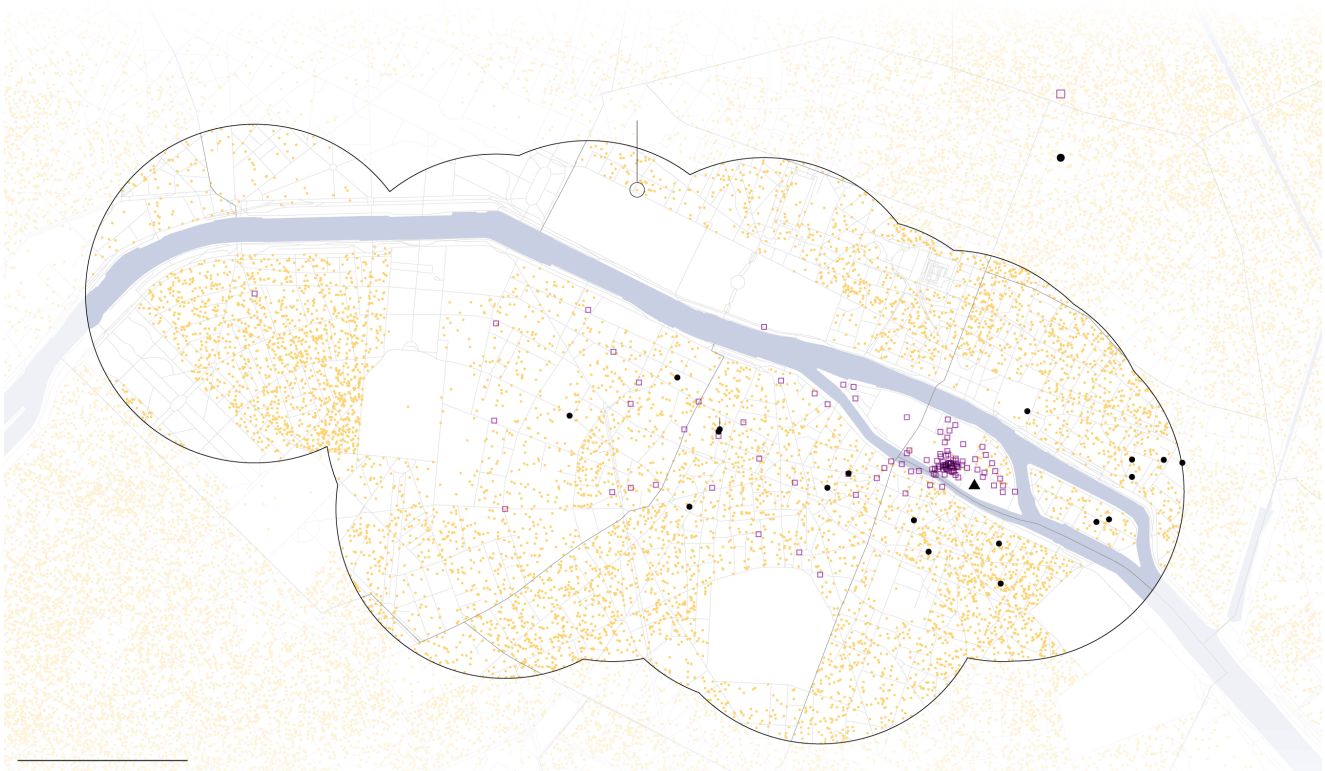
This month, Paris officials opened public schools for a new academic year and said none presented alarming lead levels any longer. Some private schools did not open on time, for fear of lead.

Many parents are unconvinced that the schools are lead free, partly because of the lack of transparency from the authorities.

Only gradually did public awareness of the problem grow. It took a lawsuit, leaked test results in the French press and public criticism from experts.

Experts have differed on whether the city should conduct mandatory testing on children in the exposed area. Some French experts argue that high lead levels on surfaces do not necessarily correlate with individual children being contaminated.

But many children were put at risk. More than 6,000 people under age 6 live within a half-mile of sites that tested high for lead levels.



The health authorities's refusal to require testing of children will make it nearly impossible to assess the full extent of exposure, since lead levels reduce over time, as the element is eliminated from the body.

"They didn't encourage people to get a lead concentration, they didn't close the schools, the Health Regional Agency didn't send any alert," Ms. Thébaud-Mony said.

"The city of Paris hid behind them," she said.

Hundreds of children were exposed

As imposing as a fortress, the Paris Prefecture Police Headquarters sits directly across from Notre-Dame and served as a command center the night the cathedral burned. As sirens blared and firefighters worried that Notre-Dame might collapse, a day care center inside the police building was hurriedly closed, for fear it could be crushed by falling debris.

Within days, the day care center, which was for the children of officers, was tested for lead. In some areas, like the “millipede playroom,” the tests found lead levels up to 2.5 times the French standard for buildings hosting children, according to a confidential police document.

The report offers evidence that the French authorities were aware of the threat of lead contamination within days of the fire but kept quiet.

The officers’ children were moved to a second day care center farther away from Notre-Dame, in another building of the headquarters. As many as 80 children would play in this second day care center in the coming weeks. But it turned out that second building was contaminated, too.

Cleaning up at the Saint-Benoît school last month. Christophe Petit Tesson/EPA, via Shutterstock

New tests revealed more alarming results, which were initially kept from officers, and from the general public. Police authorities did not respond to repeated requests for comment.

At the second day care center, more than 20 measurements showed lead levels at or above the threshold for buildings hosting children. They included the “goblins” playroom and rooms where nurses fed children with baby bottles.

Windows in the building had been left open during the fire, according to the confidential police report. Other tests found at least six offices were contaminated with lead levels up to 17 times higher than the regulatory threshold.

Experts said the officers could have been vulnerable both to inhaling the dust as it swirled during the fire and ingesting it afterward.

“We kept hearing rumors in corridors that made us worried,” said one officer, who spoke on the condition of anonymity because of police guidelines, and whose 2-year-old daughter was one of the children who used the playroom.

In early May, city officials finally closed the second day care center for decontamination and informed officers of the situation.

But still no broader alarm was sounded.

“We took measures immediately and closed our own day care centers for a month and a half,” said Frédéric Guillo, a police officer and representative at the C.G.T., one of France’s largest unions.

“Why didn’t public authorities do anything for the other ones?” he asked.

One problem is that different messages were coming from different government agencies.

On May 9, the Regional Health Agency released a reassuring statement to the public, merely confirming “the presence of lead dust in the immediate surroundings of the cathedral.”

At the same time, officials from the Culture Ministry, responsible for Notre-Dame’s reconstruction, were playing down the risks in a meeting with public health authorities, labor inspectors, police and local officials, according to one person who attended.

Antoine-Marie Préaut, a regional conservator at the Culture Ministry, denied that and said the authorities took the concerns seriously. “We haven’t been downplaying the risk over lead contamination,” he said in a telephone interview.

Tourists on Rue du Cloître-Notre-Dame four months after the fire, when it was still being decontaminated. Dmitry Kostyukov for The New York Times

The city’s public schools and day care centers near Notre-Dame remained open for weeks after the fire. In early May, city officials issued “recommendations” for cleaning at schools around the cathedral but offered little guidance to parents.

Then, without any public notice, the city began conducting the first tests for lead at public primary schools in mid-May. Ms. Souyris, the deputy mayor, said it was up to the heads of schools to inform parents of the tests. Some did but others did not, The Times found.

During the next two weeks, nine primary schools and day care centers close to Notre-Dame were tested — six of which had lead levels up to 2.5 times the regulatory threshold.

Schools closed for the summer in July, and public anxiety began to mount. In early July, Mediapart, a French investigative website, published the first leaked documents about lead concerns in and near Notre-Dame. Parents demanded greater clarity about the risks, and environmental groups sounded alarms.

Earlier, the regional health agency had “invited” pregnant women and children under 7 to have their lead levels tested. Now the agency focused on schools, widening the perimeter of concern and the number of schools for testing.

As results came in, it became clear that more and more schools had alarming levels of lead.

By then, children had already left for summer vacation, though some schools around Notre-Dame continued to operate as summer camps.

In at least 18 day care centers, preschools and primary schools, tests revealed lead levels over the recommended threshold. Two schools being used as summer camps were closed after tests revealed alarming lead levels.

At one, Saint-Benoît, in the Sixth Arrondissement — just across the Seine, on the Left Bank — several places in the school and its playground showed lead levels up to seven times recommended levels.

Among the rooms over the threshold was the cafeteria, where children are likely to put their hands in their mouths and on their food.

Notes: The French guideline for safe lead levels inside buildings hosting children is below 6.5 micrograms per square foot. For outdoor spaces, it is below 93 micrograms per square foot. Lead test locations are approximate.

Sources: Regional Health Agency, City of Paris; Imagery by Google Earth

By Anjali Singhvi

Because Saint-Benoît and most other schools had not conducted tests for lead before the fire, city authorities have warned that high levels could have other historical causes.

“It’s highly unlikely that the levels found at Saint-Benoît were linked to the fire,” argued Ariel Weil, the mayor of the city’s Fourth Arrondissement, home to the cathedral. But he added, “If Notre-Dame has triggered an overall cleaning of Paris, so much the better.” The head of the school did not respond to requests for comment.

Whatever the source of the lead, in early August, workers in full, white protective outfits sprayed blue gel on the schoolyard’s asphalt before tearing it up.

It remains unclear why all schools in the area were not tested sooner. Many of the test results were made public only after public pressure mounted. A few weeks later, in late July, a French environmental group filed a lawsuit against the government over its delayed response.

In a telephone interview, Ms. Souyris, the Paris deputy mayor in charge of public health, said local authorities had not publicized the test results because they wanted to coordinate with state officials. She also said, as do some other officials, that a city as old as Paris has a lead problem that long predates the Notre-Dame fire.

“We are facing a widespread issue around lead,” Ms. Souyris said. “It goes beyond Notre-Dame, but since there is no norm for public spaces, we need a bigger plan against lead in Paris.”

With some exceptions, lead regulations in France are guidelines, not legally binding rules. That makes them essentially, optional.

The Health Ministry has ruled that lead levels over 70 micrograms per square meter, or 6.5 micrograms per square foot, amount to “a risk of lead contamination for exposed children” and should lead to “a quick intervention.”

But that pertains to indoor spaces. In Paris, officials have waffled on the proper outdoor threshold.

In the weeks after the fire, they cited 93 micrograms per square foot as the guideline. But as public criticism reached a fever pitch in mid-July, regional health officials essentially raised the limit, citing a new figure of 464.

At Combattants de la Nueve, a tiny square where children play from a kindergarten less than a quarter mile from Notre-Dame, tests in late August showed soaring lead levels.

The Regional Health Agency said people should “expect” high blood lead levels with such exposure and “invited” the children who attended the kindergarten to have their blood lead tested.

“This is a huge concern,” said Perry Gottesfeld, executive director of Occupational Knowledge International, and an expert on lead testing and health, “because we know that soil contamination in this range is closely linked to elevated blood lead levels.”

But indoor or outdoor, the guidelines are essentially voluntary, not legally binding. That regulatory void has created confusion among authorities, reinforcing concerns of parents and other residents.

“We could have communicated earlier,” Ms. Souyris said. “The fact that we don’t even have norms for public spaces may have explained why health authorities took so much time in communicating more.”

Worry increased as questions went unanswered

As Parisian families send their children back to school, many are wondering whether their children have been exposed to lead, and whether they are still at risk.

“Schools and local authorities first tried to be reassuring,” said Anne Souleliac, a mother of three, who lives in the Fifth Arrondissement.

“But have we really gotten the measure of the risk? I don’t think so.”

In May, Ms. Souleliac asked the principal at her eldest son’s private primary school to conduct lead tests, but her demands were ignored, she said. By August, school officials had pivoted and conducted the tests after officials widened the area of concern. The results were not publicly released, but the opening of the school was delayed for the fall term.

Anne Souleliac with her daughter at home in the Fifth Arrondissement. Dmitry Kostyukov for The New York Times

In all, five private primary schools did not reopen on time, as the authorities continued to test for lead.

Though the Regional Health Agency has resisted calling for mandatory testing of children, the parents of roughly 400 children have had them tested, many on their own initiative, the agency said in a statement on Thursday.

Of those, 8.5 percent showed levels at or above the French regulatory threshold for concern. The agency did not reveal which schools the children attended.

Public officials have emphasized that “environmental measurements” conducted as early as the day after the fire had revealed a “good air quality.” No mention was made of the hundreds of bystanders who watched Notre-Dame burn and may have been exposed to lead dust in the atmosphere.

“It’s understandable that parents ask questions,” said Dr. Fabien Squinazi, a former head of the Paris Public Health Laboratory who advised the authorities over the summer. “But if children have spent a couple of minutes in a schoolyard with high lead levels and the rest of the day in a classroom that is not contaminated, there is no reason to be worried.”

“A high lead level on surfaces doesn’t automatically mean that a child has been contaminated,” he said.

The area that has gotten the most official attention is the Île de la Cité, the island in the Seine where Notre-Dame is located. Local authorities set up a special center to test children under 7 and pregnant women living there.

But for everyone else, including those living in the broader area of concern, lead tests are provided only to people with special prescriptions from doctors.

Ms. Souleliac, who works on the Île de la Cité but does not live there, wanted her daughter to be tested as quickly as possible. But that proved challenging. Her doctor and day care center were not alarmed at first.

"It took health authorities two months to test my daughter, two months to take tests at the day care and at my nanny's apartment," Ms. Souleliac said. "I'm not sure people are aware of how toxic lead can be for young children."

When she was finally tested, the girl had 1.1 micrograms of lead per deciliter, below the threshold of 2.5 micrograms.

The regulatory threshold for concern in France is 2.5 micrograms per deciliter, but experts warn that any level of lead can cause harm.

Catherine Leroy had not thought about potential health risks for her 2½-year-old daughter until news articles mentioned lead concerns and friends warned her about toxic particles.

Catherine Leroy with her daughter, near the cathedral. Dmitry Kostyukov for The New York Times

Ms. Leroy, who lives on Rue Chanoinesse, less than 300 feet from the cathedral, took the child for a test in mid-May. The results showed lead levels of 1.9 micrograms per deciliter.

The result wasn't alarming, she was told, but state contractors cleaned her apartment anyway because it was deemed to be in a risky zone.

"The authorities have poorly communicated about it," Ms. Leroy said on a recent morning, as she took the girl to a nearby park on her bike.

"We received information bit by bit," she said. "But we've been feeling a little forgotten."

Those most in danger? The restoration workers

The people exposed to the highest levels of lead have been the workers at the cathedral itself. Amid growing public concern over contamination, the authorities shut down work at Notre-Dame in July, saying stricter measures were needed "in accordance to labor inspection's requests."

In fact, work at the site was stopped only after seven alarming letters, dozens of emails and a series of heated meetings between labor inspectors and those trying to carry out reconstruction of Notre-Dame on President Macron's ambitious five-year timetable.

The confidential letters from labor inspectors, obtained by The Times, reveal a multitude of lapses that exposed workers to exceptionally high levels of lead.

Tests taken inside the cathedral found lead levels up to 588 times above the regulatory threshold.

On the plaza, open to workers and security agents, levels were up to 1,300 times higher, according to the Culture Ministry's confidential measurements obtained by The Times. Outside the construction site on the nearby pavements, workers were exposed to lead levels up to 955 times the threshold.

A month after the fire, one labor inspector warned that safety gear was not being worn by some workers and urged authorities "to implement, without waiting, measures to protect employees for risks of lead exposure."

Adding to the dangers, inspectors noticed that workers operating inside the cathedral were not decontaminating their clothes under their jumpsuits as they left work. Workers would then bring those clothes back home, exposing their families to possible lead contamination.

Their children should be screened, said Dr. Squinazi, the Paris expert. "That's a big criteria," he said. "Children of workers are running a greater risk."

Police officers without protective gear inside the cathedral the day after the fire. Pool photo by Christophe Petit Tesson

When workers started to decontaminate the plaza, in early June, they wore no protection, and had not received any training about lead exposure, the labor inspector found. In a final letter dated July 22, another labor inspector found workers entering the site through the decontamination units that were supposed to be used to let them out.

"The current organization doesn't allow an effective decontamination of the workers," the inspector concluded.

The inspector threatened to shut down the site if safety measures weren't followed. Three days later it was.

Furious union officials have accused the government of putting the reconstruction of the monument ahead of health concerns. The Culture Ministry rejects the claim.

"We're not denying that there has been a risk with lead, but the measures we implemented really soon after the fire have helped avoid exposing workers," said Mr. Préaut, the Culture Ministry conservator.

Workers wearing masks on the rooftop of Notre-Dame in August. Dmitry Kostyukov for The New York Times

Of the dozens of workers who have been at the site, Mr. Préaut said, three had shown lead levels over the regulatory threshold in their blood. They are being monitored by doctors.

The contractors being used say they test their workers, but they have not released the results because of medical confidentiality.

Mr. Préaut said lead exposure is a complicated topic, partly because of the lack of clear regulatory thresholds.

“There is lead elsewhere in Paris,” Mr. Préaut said, “And every time there is construction here, we find some lead around it.”

Work on the cathedral resumed on Aug. 19 with a host of new safety measures, including foot baths, decontamination showers and disposable underwear. A contracting company decontaminates work clothes. Strict checks have been put in place on entering and leaving the site.

Yet even after construction resumed, workers could still be seen wearing no gloves or masks on the northern side of the cathedral. Lead levels in that area were up to 10 times above the recommended threshold, according to the Culture Ministry’s own measurements.

The long plume of smoke that rose from the cathedral. Maxime Brunet/Elastiqueprod, via Agence France-Presse — Getty Images

On the roof, where some workers operated without masks or gloves for months, some measurements were 2,300 times above the safety threshold.

Notre-Dame’s architect in chief, Philippe Villeneuve, called the lead one of the most complex challenges facing the reconstruction.

“The roof, the spire, the vaults, we know how to reconstruct them,” he said. “But lead? We don’t know the thresholds, or the exact rules to follow.”

He and others now fear the work will be slowed by the precautions.

“We’re not working with the same rhythm and constraints anymore,” he said, blaming “the lead issue.”

“We’re not done with that lead thing.”

For merchants, the pain is continuing

In the streets around Notre-Dame, business owners have seen revenues plunge since the fire. Tourists have been blocked from some streets, the plaza and the cathedral, once among the most visited sites in the world.

Merchants say that city or state inspectors have conducted lead tests in their cafes and restaurants, and that they are safe for customers.

At Au Vieux Paris d'Arcole, a restaurant one street away from Notre-Dame, Frédéric Benani, a waiter, said measurements had been taken inside and on the terrace. Visitors who posed for selfies in front of the restaurant's iconic wisteria had no reason for concern, he said.

Revenues have plunged at restaurants and cafes near the cathedral, once filled with tourists. Dmitry Kostyukov for The New York Times

"We don't want people to freak out, it's already been painful enough," said Mr. Benani, who watched the cathedral burn from the window of his apartment above the restaurant.

The street adjacent to Notre-Dame was decontaminated in late August. Now, local residents and business owners are trying to balance lingering concerns about whether there is still any danger with fears about their threatened livelihoods.

Marie-Madeleine Miquel, or Mado, the 80-year-old owner of three restaurants near the cathedral, said tests had shown no alarming lead levels.

Yet she has lost 90 percent of her revenues since the fire, she said.

"It's not lead that's going to kill me," she said, sitting in her empty restaurant, as some parts of her street were cordoned so decontamination operations could be completed. "It's the lack of tourists."

Others have remained concerned, even as anxiety gives way to uncertainty.

"All children haven't been tested, the parents are ill-informed," said Mathé Toullier, the spokeswoman for France's top organization representing victims of lead poisoning.

"We will only know in a couple of years if there are consequences, and they could be terrible."

Dmitry Kostyukov for The New York Times

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