



CDC'S LABORATORY RESPONSE NETWORK FOR CHEMICAL THREATS

2022-2024 HIGHLIGHTS





Large-scale chemical emergencies remain a significant public health concern in the United States. The U.S. Centers for Disease Control and Prevention serves at the epicenter of the nation's prevention and response efforts.

CDC's Laboratory Response Network for Chemical Threats (LRN-C) provides the rapid expertise essential for protecting the health and safety of Americans. In fact, a quarter century on, the LRN-C continues to advance the nation's security capacity and capability for responding to large-scale chemical emergencies. CDC's Division of Laboratory Sciences (DLS) maintains the critical preparedness infrastructure of 54 LRN-C laboratories, including locations in all 50 states, 3 localities, and 1 U.S. territory. DLS provides technical assistance for chemical threat (CT) laboratory test methods, hands-on CT methods training, quality control materials and reagents, and emergency response coordination. These services ensure the readiness of the laboratory network in the event of a large-scale chemical emergency or act of terrorism.

Key Accomplishments

Ensuring LRN-C Capabilities Through Partnership Training and Outreach

In April 2024, DLS Emergency Response Branch partnered with the Association of Public Health Laboratories (APHL) to host the 2024 LRN-C National Meeting in Jacksonville, Florida. The meeting included sessions on developing training curricula and exercises with preparedness partners, such as local FBI Weapons of Mass Destruction Coordinators and local hospitals. The following July, DLS and APHL collaborated to record a “Train the Trainers” webinar on engaging with partners on chemical threat preparedness and response capabilities.

Using New Approaches to Train LRN-C Laboratories in Response Coordination

The 2024 LRN-C National Meeting included a tabletop exercise with over 150 chemical threat laboratory professionals from 35 LRN-C laboratories. “This Is a Test” (TEST) is a CDC board game that allows participants to engage as fictional responders in various preparedness roles during a mass radiation exposure event. The 2024 LRN-C tabletop exercise was a powerful learning tool for LRN-C staff to identify potential gaps in emergency operations during a mass casualty event.

Supporting a National Response to Contaminated Applesauce Products

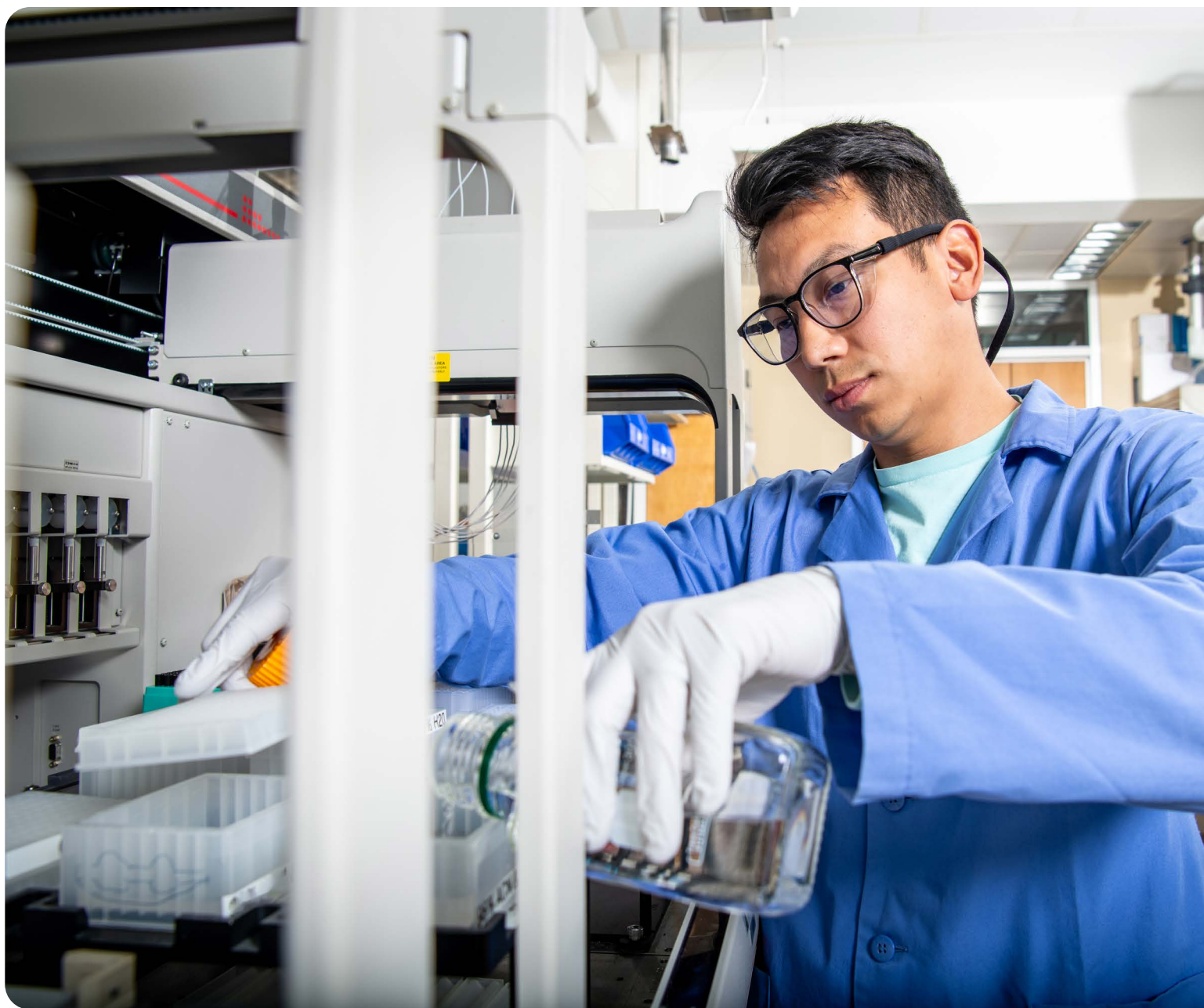
In summer 2023, four children in three unrelated North Carolina households were found to have elevated blood lead values. Childhood lead poisoning prevention program investigations linked the exposures to WanaBana® Apple Cinnamon Fruit Puree pouches. Once the manufacturer and the Food and Drug Administration (FDA) were notified, a voluntary product recall was announced in November 2023. FDA worked with LRN-C laboratories in Maryland, Pennsylvania, North Carolina, and Virginia to support clinical testing in the investigation. Since the initial recall, these applesauce products have been linked to over 500 cases of elevated lead values reported to CDC.

Data Modernization and Opioid Response Capacity Building

In 2023, DLS worked with CDC’s National Center for Injury Prevention and Control and APHL’s Opioids Biosurveillance Taskforce to develop testing guidelines for local opioids biosurveillance. This framework document supports CDC’s aim to collect a standardized national dataset that is readily accessible to public health policy makers. DLS also developed strategic plans for implementing Electronic Laboratory Reporting (ELR), a CDC data modernization initiative to utilize HL7 standards for data exchange. This project will support near real-time data messaging for LRN-C laboratories. This ensures that CDC has access to local surveillance data earlier, to better support intervention strategies sooner.

First Virtual Hybrid Training for LRN-C Methods for Toxic Metals

In August 2023, DLS staff held the first LRN-C hybrid training session for testing exposures to toxic metals. More than 80 participants attended the four-day virtual training, which included both recorded and live sessions. Typically, an “in-person” approach is the preferred training method for teaching sophisticated analytical chemistry methods using mass spectrometry. However, this limits the number of participants that can be trained during a given session. This virtual hybrid approach to training allowed DLS staff to train significantly more people than CDC can typically accommodate in a single in-person session, enabling CDC to better meet the needs of a nationwide staffing shortage. Furthermore, hybrid offerings allow trainees to avoid costly travel expenses as well.



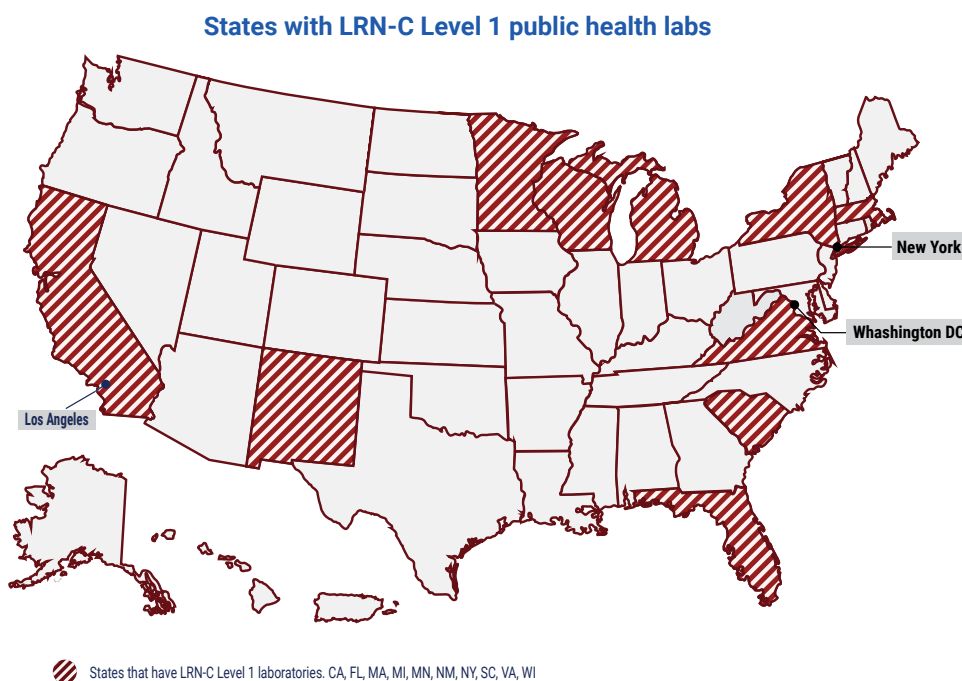
FY 2022-2024 LRN-C In Action

LEVEL 1. HIGHLIGHTING RESPONSES TO UNKNOWN OR SUSPICIOUS THREATS

LRN-C Level 1 laboratories analyze unknown substances and collaborate with federal and local partners such as the FBI, fire departments, and police departments. Level 1 laboratories can detect exposure to several toxic chemicals, including mustard agents, nerve agents, and toxic industrial chemicals. They identify, analyze, and rule out chemicals to determine credible threat events. They can also provide CDC with surge capacity during large-scale events.

Chemical Threats Sent Through the Mail

In 2023, a courthouse received a threatening letter containing white powder. An LRN-C Level 1 laboratory in Saint Paul, Minnesota, analyzed the powder and confirmed the presence of benzyl benzoate, a medication prescribed to treat lice and scabies which is not considered harmful to most people. Thanks to the Minnesota Public Health Laboratory's LRN-C capacity, they were able to promptly rule out potential threats such as ricin or fentanyl during this response.



Drugs of Abuse: Overdoses

In May 2024, the Delaware Public Health Laboratory requested assistance from the LRN-C Level 1 Laboratory located in Richmond, Virginia. The laboratory tested six urine samples from a Delaware law enforcement case involving illicit drugs. The Virginia laboratory employed high resolution mass spectrometry along with the use of a comprehensive drug screening library to identify the presence of fentanyl analogs and other illicit drugs.

Toxic Metals: Mercury Exposure

In October 2022, the LRN-C Level 1 laboratory in Albany, New York, provided emergency response testing for 20 workers who were unintentionally exposed to mercury at a manufacturing facility on Long Island. The laboratory worked in collaboration with OSHA and the state health department's Center for Environmental Health to test 20 blood and urine samples of symptomatic employees who were likely exposed to unsafe levels of mercury without the benefit of engineering controls to mitigate this exposure. Results indicated high levels of mercury in both urine and blood samples for five of the employees. The workers continue to receive medical treatment related to this exposure.

In October 2023, a local hospital and poison center requested urine analysis from the Minnesota LRN-C laboratory for a family who had used skin-lightening creams. The laboratory identified dangerously high mercury levels in two of three family members. Thanks to swift action by the LRN-C, the family received treatment for mercury exposure.

Toxic Metals: Lead Exposure

In 2023, health officials determined that several classrooms in a daycare center in Wisconsin had higher than the allowable limits for lead in drinking water. In collaboration with the Department of Health Services, the Wisconsin LRN-C laboratory trained clinical staff on sample collection and analyzed 11 samples. Thanks to the training provided by the LRN-C laboratory, more than 100 families were notified of potential lead exposure.

Poisonings: Alcohol

The LRN-C laboratory in Virginia analyzed samples of watermelon juice when two children were hospitalized after consuming it. Ethanol was found in the juice. The children received treatment for their illness thanks to the LRN-C laboratory's rapid testing capabilities.

LEVEL 2. HIGHLIGHTING LOCAL CAPACITY BUILDING

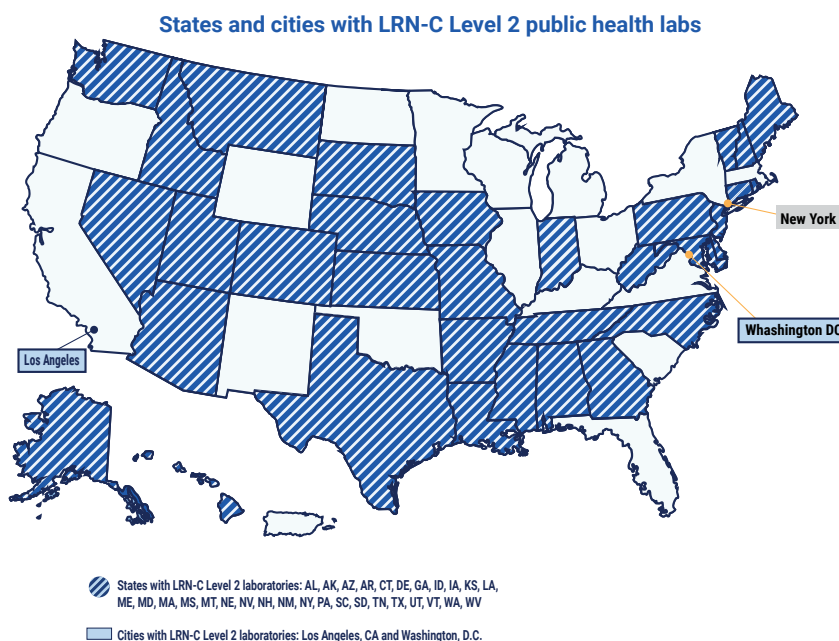
LRN-C Level 2 laboratories are crucial to building local capacity and addressing specific concerns within their communities. These laboratories can detect exposure to many toxic chemical agents. They leverage their infrastructure and expertise to support local concerns such as biomonitoring and opioids biosurveillance testing for illicit drugs like fentanyl. They also support public health initiatives to combat opioid abuse. LRN-C Level 2 labs also enhance local capacity by providing training, guidance, and support to other laboratories and agencies within their regions. This strengthens overall response capabilities and ensures a coordinated approach to addressing chemical threats and emergencies at the local level.

Toxic Metals: Mercury

In 2022, the LRN-C lab in Texas analyzed 10 urine and three blood samples from six family members, including multiple children, who were exposed to elemental mercury in Missouri. Because of the prompt response and analysis by the LRN-C lab, the children received lifesaving treatment.

Poisonings: Potential Gasoline Ingestion

In August 2023, a medical examiner's office contacted the LRN-C Level 2 laboratory in Salt Lake City, Utah, to confirm the presence of gasoline in the gastric fluids of a recently deceased person. The laboratory analyzed an oily substance from the stomach and a blood sample and found extremely high levels of benzene, toluene, ethylbenzene and xylenes.



Environmental Samples: Thallium Outbreak

In October 2021, USDA detected a thallium outbreak at a cattle ranch in Northern Utah. In August 2022, the Idaho Department of Environmental Quality submitted samples from the nearby Malad River Valley to the LRN-C Level 2 laboratory. The laboratory tested 10 water samples for thallium, potassium, and lithium. Two of them tested positive for thallium. Because of the local and state chemical threat laboratory capacity maintained by CDC, the LRN-C laboratory in Idaho was able to rapidly test and provide results.

LEVEL 3. HIGHLIGHTING PARTNERSHIP TRAINING AND OUTREACH

LRN-C Level 3 laboratories actively engage in numerous outreach activities throughout the year. They work closely with hospitals and first responders to maintain competencies in clinical specimen collection, storage, and shipment, which promotes preparedness measures.

These collaborations foster information sharing, resource coordination, and joint planning, and ensure a comprehensive approach to chemical incident response. The labs leverage resources efficiently, share knowledge effectively, and empower local stakeholders to play an active role in protecting the public from chemical threats.

The New York City (NYC) Department of Health and Mental Hygiene

Each year, the New York City (NYC) Department of Health and Mental Hygiene participates in CDC-led emergency response exercises. Readiness drills are a critical component of laboratory preparedness in highly populated jurisdictions such as New York City, where 28 major emergency responses have been reported since 1999.

- Annual Specimen Processing and Packaging Exercise: prepared and shipped 40 blood and urine samples
- 2022 Capability Exercise: packaged and shipped 30 blood samples to three reference labs
- 2024 Emergency Response Exercise: packaged and shipped 10 urine samples to one reference lab

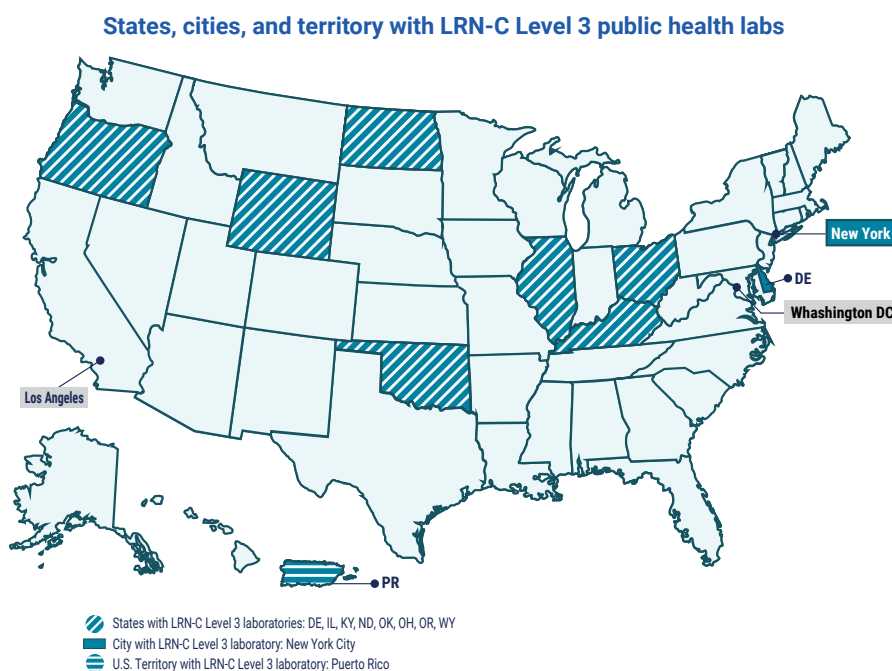
The NYC LRN-C laboratory is ready to respond to emergencies by following LRN guidelines and in-house standard operating procedures.

The Oregon Clinical Laboratory Consortium Meeting

In September 2024, Oregon's LRN-C Level 3 Coordinator joined representatives from nine local hospitals to discuss operational plans in the event of communication failures during a wildfire response. The group identified potential weaknesses related to laboratory involvement and proposed generating an updated laboratory contact list to ensure that Oregon LRN-C laboratory is better integrated into local emergency response planning.

All-Hazards Exercise: Fourier Transform Infrared Spectroscopy (FTIR)

During an all-hazards exercise in August 2024, after performing the Laboratory Response Network for Biological Threats protocols for white powder events, the Kentucky LRN-C Level 3 laboratory analyzed white powder for chemical composition using FTIR. The successful testing allowed laboratory staff to retain competency on use of the instruments and interpretation of the results.



LRN-C: The Next 3 Years

Over the next three years, CDC will implement the following strategic goals:

- Provide technical and educational resources to LRN-C laboratories, ensuring a well-trained laboratory workforce in local and state public health laboratories nationwide.
- Increase LRN-C testing capabilities to include more known toxic and incapacitating agents such as chlorine, fentanyl and carfentanyl.
- Implement standardized testing approaches for identifying unknown agents using high resolution mass spectrometry.
- Introduce updated platforms to capture test requests for chemical threat agents that are not included in LRN-C's current methods list. This information could potentially enable CDC's Emergency Response Branch to better identify and predict laboratory preparedness gaps and emerging chemical threats.

