24/7 Emergency Response

Providing round-the-clock expertise and technical capabilities to support civil-emergency response and preparedness, military operations, and the intelligence community.

Scientific Expertise on Call

As a long-established Department of Energy (DOE) / National Nuclear Security Administration (NNSA) partner and member of the interagency nuclear and radiological emergency-preparedness and response community, Lawrence Livermore National Laboratory (LLNL) provides round-the-clock expertise and technical capabilities. Laboratory teams support civil-emergency scenario planning, crisis assessment and analysis of chemical, biological, radiological, nuclear, and explosive (CBRNE) threats against the U.S., and research and develop tactical tools for military operations and the intelligence community.

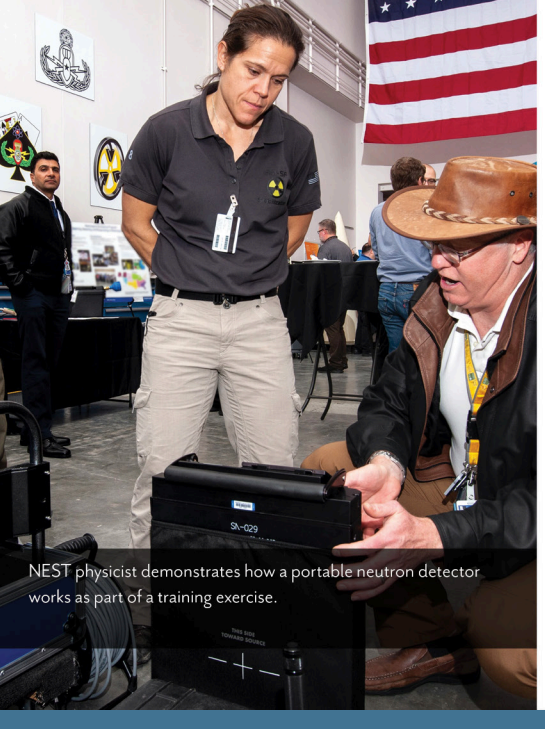
The Laboratory's trained, certified interdisciplinary teams of subject-matter experts possess a unique collection of skills, experience, and abilities across a range of disciplines from atmospheric modeling to weapons physics and data science and can be deployed on-site or off, within minutes, 24 hours a day, seven days a week.

LLNL's multidisciplinary teams and facilities respond to hazardous atmospheric releases, characterize and defeat nuclear threats, or, should a detonation occur, provide forensic and consequence management assistance to U.S. government officials as well as state and local authorities.

Applications

LLNL provides U.S. interagency response support against a range of nuclear, radiological, chemical, biological, explosive, and cyber threats. Various LLNL response teams provide levels of support, including 24/7 crisis assessment and forensic analysis. The Laboratory applies its response expertise in the following areas:

- LLNL is one of the three DOE laboratories that directly supports the Nuclear Emergency Support Team (NEST), NNSA's multi-mission, nuclear-emergency response capability that leverages DOE's world-class scientists and technical experts to contend with the nation's most pressing radiological and nuclear challenges. NEST is the umbrella designation that encompasses all DOE/NNSA radiological and nuclear-emergency response functions, some of which date back more than 60 years.
- NEST's National Atmospheric Release Advisory Center (NARAC) responds 24/7 to hazardous atmospheric releases anywhere in the world—predicting their evolution, exposure levels, and trajectories to protect the public and the environment. NARAC has developed an operational urban-dispersion capability and a fallout model based on first-principles physics and chemistry.
- One of two U.S. laboratories with international certification to handle chemical warfare agents, LLNL's Forensic Science Center provides sample analysis across the chemical, biological, radiological, nuclear, and explosive (CBRNE) threat space.
- LLNL and Los Alamos serve as national laboratories for the Bulk Special Nuclear Materials Analysis Program, a U.S. interagency program that ensures accurate analysis of nuclear material.
- The Counterproliferation, Analysis, and Planning System strengthens CBRNE capabilities across the Department of Defense by providing intelligence analysis and reach-back support to the intelligence community and combatant commands.
- Infrastructure protection and security experts at LLNL evaluate electrical grids, oil refineries, natural gas networks, railways, ports, and waterways for physical and cyber security. Specifically, the Rapid Impact Vulnerability AnaLysis (RIVAL) response leverages critical infrastructure expertise, intelligence information, and modeling and simulation capabilities. These resources evaluate emerging cyber threats, portray potential scenarios, reveal potential impacts, and recommend mitigation strategies.
- International Nuclear and Radiological Security teams work worldwide to secure and protect nuclear and radiological materials from theft, sabotage, and terrorism.



NEST physicist demonstrates how a portable neutron detector works as part of a training exercise.

LLNL's emergency response expertise directly benefits American warfighters abroad. Military and intelligence operations rely on decisive, authoritative information from LLNL's cohort of experts.

NARAC provides timely and accurate plume predictions to aid emergency preparedness and response efforts in protecting the public and the environment.

Accomplishments

LLNL's decades-long record of emergency preparedness and response relies on its interdisciplinary teams of subject-matter experts who possess a keen understanding of risks and threats; preparation and execution of policies, plans, and procedures; and development of innovative technologies to prevent, mitigate, and respond to threats. LLNL has provided urgent support to the U.S. Government during several recent incidents and emergencies and for emergency preparedness including:

- Ukraine (2022): NEST continuously monitors data from radiation detection sensors in Ukraine and the surrounding region to ensure real-time situational awareness of nuclear facilities. Sensor data provides early warning of an emergency at these facilities and allow DOE/NNSA scientists to provide critical technical guidance to Ukrainian partners to inform measures to protect public health and safety.
- Plutonium Finishing Plant at Hanford (2018): Assessments of potential contamination at the Plutonium Finishing Plant at the Hanford Site in Washington state were made by NARAC using a fast-running, urban-dispersion model to determine if contamination levels warranting controls might extend beyond established radiological boundaries.
- Ruthenium Detections Across Europe (2017): When a mildly radioactive plume of ruthenium-106 appeared in the atmosphere across Europe, NARAC quickly estimated probable source locations and strength using a machine-learning tool.
- Apex Gold (2016): LLNL hosted the first, minister-level exercise to identify national and international actions to address a simulated nuclear crisis and advise heads of government how to best prepare 24/7 response to a nuclear-security crisis.
- PG&E Substation Sniping (2013): After a domestic terrorism incident at an electric power station in California, LLNL conducted immediate after-action analysis, assessed security vulnerabilities, and recommended security enhancements.
- Fukushima Daiichi Nuclear Disaster (2011): LLNL deployed NEST's Radiological Assessment Program team, in conjunction with NARAC's ongoing plume modeling predictions, to analyze radiological samples to inform on public health and safety. This 24/7 effort was sustained for many weeks after the disaster.

The Future

LLNL continues to advance its technical capabilities and contribute to the nation's credible response posture by applying advances in high-performance computing and artificial intelligence as well as by rapidly gathering and interpreting intelligence and assessing credible threats.

LLNL directly supports the U.S. response infrastructure by training first responders to improve their effectiveness and reduce response times.

LLNL subject-matter experts are developing high-fidelity training materials and leveraging next-generation technologies such as augmented reality to advance first-responder training.

As LLNL researchers continue to develop informed innovative technologies, the Laboratory's 24/7 operational technical support will be further enhanced to provide increased confidence for timely and effective national emergency response.

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