



U.S.EPA New England Regional Laboratory



United States
Environmental Protection
Agency New England

EPA- 901-F-04-005

May 2004

Introduction



Preparing samples for analysis

EPA's New England Regional Laboratory (NERL), part of EPA's extensive national network of scientific research and regional laboratories, supports the New England office. NERL, located in Chelmsford, Massachusetts, is a state-of-the-art "green" facility that houses an organization responsible for the design, collection and analysis of environmental data.

NERL uses its scientific and engineering staff, with expertise in chemistry, biology, engineering and environmental science, to ensure that high quality and sound science are the foundation of the environmental measurement work conducted in the region. EPA scientists and engineers use state-of-the-art equipment and techniques and apply rigorous quality assurance standards.

The results of field and laboratory studies support EPA's mission to protect human health and the environment by:

- monitoring and analyzing environmental conditions to determine human health risk and ecological health;
- determining compliance with environmental laws and regulations;
- measuring environmental benefits and our programs' progress; and,
- identifying emerging threats to the environment or public health.



Inside EPA's Mobile Lab

The New England Regional Laboratory conducts its monitoring and analytical work collaboratively with EPA and state programs, interstate organizations, New England tribes, other federal agencies, local governments, non-governmental organizations and academic institutions. Working with our partners, we strive to be leaders in identifying emerging environmental problems and in developing new and innovative solutions to collecting and integrating environmental data and information across all media.

Protecting Our Environment through Sound Science

EPA's New England Regional Laboratory monitors the health of our environment and its impacts on public health

Monitoring the Environment

EPA, states and tribes collect data critical to implementation of our environmental programs:

- Sampling for clean up of contaminated sites
- Analyzing residential soil for lead
- Measuring mercury deposition
- Monitoring air for smog, particulates and other pollutants
- Testing drinking water wells for arsenic
- Measuring water pollution

Monitoring Air Quality

Air monitors allow us to:

- Identify areas with unhealthy air
- Identify trends
- Use real-time data to forecast unhealthy levels

Monitoring Ecosystem Health

EPA is embarking on a multi-year assessment of New England's waters and aquatic life, allowing us to:

- Measure the biological health of lakes, rivers and streams
- Provide baselines by which we can measure our progress
- Identify polluted rivers and lakes

Assuring Compliance

Provides critical data to assure compliance with environmental laws and rules:

- Inspect facilities and collect soil, sediment, water, air, and waste samples
- Analyze samples to determine compliance with permit limits
- Observe air emission stack tests

Responding to Emergencies

- Enhancing our laboratory's ability to analyze samples and provide critical information to responders to disasters or terrorist incidents
- Building a network of regional laboratories, each with unique abilities, for coordinated responses
- Supporting air monitoring for biological agents for homeland security

Leading by Example

The New England Regional Laboratory has received a LEED (Leadership in Energy and Environmental Design) Gold Award in recognition of its state-of-the-art green design:

- Energy efficient heating, cooling and lighting
- Active and passive solar power
- Wind-powered electricity
- Recycled materials, environmentally friendly landscaping

Case Studies

Making Urban Yards Safe for Children

Lead poisoning remains a serious threat to children's health today even though children's blood lead levels have declined dramatically in the past 20 years. Lead contamination in the environment is the legacy of lead-based paint and leaded gasoline which were banned in the 1970s. Residential lead-contaminated soils have been identified as a major route of exposure for children. The Lead Safe Yard Project reduced exposure of Boston-area children to lead-contaminated soils. A NERL chemist and a certified industrial hygienist from the Bowdoin Street Community Health Center performed on-site analysis of residential soils for lead content. They developed contamination "maps" for each residential yard by testing soil adjacent to the house, children's play areas, and any bare soil areas. Almost 100 yards have been tested by EPA. Contaminated yards were then improved using landscaping treatments to reduce the risk of lead exposure to children in the homes. More information on the Lead Safe Yard project, including an electronic copy of a handbook for implementing a lead safe yard project in your community is available at: www.epa.gov/region1/leadsafe/index.html The results: Lead hazards reduced and children's health protected.



Laboratory chemist analyzing samples

Drinking Water Contamination in Pascoag

In September of 2001, the Pascoag Utility District (PUD), the water supplier for the Village of Pascoag in Burrillville, RI, advised its customers "not to drink the water" because of MTBE (methyl tertiary butyl ether) contamination from leaking fuel storage tanks. EPA immediately sampled the untreated well water and found MTBE levels between 300-400 parts per billion (ppb), more than ten times greater than the State of Rhode Island's health advisory for MTBE. MTBE, an oxygen-containing compound, is added to gasoline to reduce air pollutants from autos. Exposure to MTBE has been linked to cancer. Further investigation revealed seven inches of gasoline floating on top of the groundwater in the vicinity of some of the town's drinking water wells. NERL assisted the state by providing laboratory analyses of 350 water samples for volatile organic hydrocarbons and MTBE. NERL also provided support through its Field Investigations Team, which used a direct push sampling device to sample groundwater and soil. NERL's mobile lab analyzed samples from the sampling wells located around the site, which supported in-the-field decisions about where to drill next. The State of Rhode Island ordered the owner and operator of the site to clean it up, but bankruptcy filings by both parties left the



Collecting sediment samples

EPA New England Regional Laboratory

Chemistry Laboratory - Chemists provide analytical testing capability to identify and measure chemicals in air, water, soil, sediment and waste samples. A broad array of sophisticated instrumentation is used to detect very low concentrations of toxic and indicator contaminants in the environment. In addition, NERL operates a mobile field chemistry laboratory which provides on-site analysis in support of on-going investigations.

Biology Laboratory - Biologists analyze environmental samples for microbiological agents in water, aquatic and sediment toxicity, as well as employ new DNA techniques. Other biological activities such as fish processing and invertebrate identification are also conducted.

Ecology Field Monitoring - The Ecology Monitoring Team measures the water quality and ecological health of New England's streams, lakes and estuaries through field investigations, such as pollutant monitoring, flow and dispersion dye studies, biomonitoring assessments, sediment oxygen demand studies, fish tissue contaminants (fish and shellfish) and sediment sampling.

state responsible for the cleanup. With federal assistance, the state protected public health by providing bottled water to PUD customers, and utilizing wells that were not contaminated and initiating cleanup at the site. For more information, visit: www.epa.gov/ne/pr/2003/jun/03063b.html

The results: A quick response to a state environmental crisis and protection of public health.

Investigating Mercury Contamination of the Sudbury River

EPA has been involved in the clean-up of the Nyanza Chemical Waste Dump site since 1987, but to further determine its impact on the environment, NERL conducted an extensive ecological assessment in 2003. The Nyanza site is a 35-acre parcel of land located adjacent to an active industrial complex in Ashland, MA. Due to past industrial uses and waste disposal practices, the



Fish collection on the Sudbury River

ory Capabilities

Air Monitoring - The Air Monitoring Team oversees the operation of more than 300 ambient (outdoor) air monitors in New England for the six priority air pollutants (ozone, sulfur dioxide, carbon monoxide, nitrogen oxides, particulate matter and lead) and real-time monitoring stations for ozone and chemicals that form ozone (ozone precursors), hazardous air pollutants, and fine particulates.

Investigations - The Investigations Team inspects and collects soil, sediment, water, air, waste and building material samples at regulated facilities to determine compliance with EPA laws, regulations and permits. The team also oversees the stack testing of air emission sources and provides field investigations support at hazardous waste sites.

Quality Assurance - Quality assurance staff help ensure that high quality data and sound science are used to support Agency decisions by providing technical assistance for project planning, expert chemistry and engineering advice, method reviews, document and data reviews, training, and assessments of laboratory and field operations.

For more information, visit: www.epa.gov/ne/lab

land, groundwater, adjacent stream, and the Sudbury River became contaminated with heavy metals, including mercury, and chlorinated solvents. It is estimated that up to 40 metric tons of mercury entered the Sudbury River during industrial activity from 1917 to 1978. Mercury remains in the sediment of the Sudbury River and has been found in nearby wetlands and in fish. NERL's ecological risk assessor worked closely with the site's Superfund project manager to develop a sampling scheme to sample tree swallows, mergansers, kingfishers, crayfish, mink and many species of fish. Scientists used special techniques to sample and collect eggs, feathers, fur and blood—without sacrificing the animal. Sediments were also collected. NERL quality assurance chemists ensured that the specialized sampling and analysis would produce quality data. For more information on Superfund and Nyanza, visit: www.epa.gov/ne/superfund/index2.html
The results: **Better understanding of the extent of mercury contamination and impacts on the wildlife to guide clean up activities.**



Water quality monitoring

Measuring the Health of New England Waters

Despite years of cleaning up New England's waters, EPA and the states still do not have adequate data to measure the improvements. As a result, NERL has undertaken a multi-year study to determine the health of New England waters. From 2000 to 2003, NERL scientists conducted an extensive biological and chemical water monitoring effort called the New England Wadeable Streams Project (NEWS). The sampling approach, using random probabilistic design techniques, has provided a comprehensive assessment of the condition of the region's wadeable streams in a statistically and scientifically valid manner providing a data baseline for measuring future trends. NERL sampled more than 50 locations all over New England for invertebrates, fish communities and water chemistry. Habitat quality at each site was also evaluated. The project provides scientists with new information about areas where the status of biological and water quality conditions were previously unknown. NERL's next effort will be to evaluate lake and pond health. After lakes and ponds, NERL will tackle New England's large rivers. To learn more about NEWS, visit: www.epa.gov/ne/lab/news.html

The results: Improved understanding of the health of New England waters and better information to document our success in protecting them.



Stream sampling for biological assessment

Informing the Public of Unhealthy Air Quality Conditions

While the number of days each year that New England's air quality violates health-based standards has decreased from the 1980s, we still have too many unhealthy days of ground-level ozone (smog) and fine particles. NERL's Air Monitoring Team, in partnership with the states and tribes, ensures that we have real-time monitoring data from dozens of monitoring sites throughout New England. This data can be used to forecast high pollution levels and warn the public appropriately. Each day, through computer downloads over telephone lines, EPA collects the monitored readings from each of the sites and uploads them to a publicly accessible website. EPA and state experts use this data to forecast air quality for the following day. When unhealthy levels are predicted, EPA and the states quickly disseminate the forecasts to newspapers, radio and TV stations, with simple tips that New Englanders can follow to reduce health risks. The air quality forecasts on the local evening news have their origin in the high quality monitoring network overseen by NERL. For more about EPA's air quality forecasts, go to: www.epa.gov/ne/airquality/forecast.html

The results: A better informed public and reduced health risks from air pollution.



Air monitoring station

Contacts

EPA New England Regional Laboratory
11 Technology Dr.
North Chelmsford, MA 01863
1-617-918-8300

Toll Free Customer Service
1-888-EPA-7341 (within New England)

www.epa.gov/ne/lab

Directions to NERL

From Downtown Boston

Take I-93 north 22 miles to I-495; take I-495 south 8 miles to exit 35 Route 3; take Route 3 north about 2 miles; take exit 32; go straight through first light and bear right at second light onto Route 4 north; turn right at the first light onto Technology Drive; about 1/4 mile on the right is the lab, a brick building with an EPA sign.

From Route 128

Take exit 32 off Route 128 onto Route 3 north; take Route 3 north about 15 miles; take exit 32; go straight through first light and bear right at second light onto Route 4 north; turn right at the first light onto Technology Drive; about 1/4 mile on the right is the lab, a brick building with an EPA sign.

From Interstate 495

Take exit 35 off I-495 onto Route 3 north; take Route 3 north about 2 miles; take exit 32; go straight through first light and bear right at second light onto Route 4 north; turn right at the first light onto Technology Drive; about 1/4 mile on the right is the lab, a brick building with an EPA sign.

From the North

Take Route 3 south to exit 32; go straight through first light; bear left at second and third lights; bear right at the fourth light onto Route 4 north; turn right at the first light onto Technology Drive; about 1/4 mile on the right is the lab, a brick building with an EPA sign.

