



# **National Risk Management Research Laboratory**

*Providing Solutions for a  
Better Tomorrow*



## Mission

As part of the U.S. Environmental Protection Agency's Office of Research and Development, the National Risk Management Research Laboratory (NRMRL) conducts research into ways to prevent and reduce pollution risks that threaten human health and the environment. The laboratory investigates methods to prevent and control pollution of air, land, and water, and to restore ecosystems. The goals of this research are to:

- (1) develop and promote technologies that protect and improve human health and the environment;
- (2) characterize releases to air, water, and land, and develop engineering information to inform and support regulatory and policy decisions; and
- (3) provide technical support and information transfer to ensure implementation of environmental regulations and strategies at the national and community levels.

In addition, NRMRL collaborates with both public and private sector partners to anticipate emerging problems and to foster technologies that reduce the cost of compliance.

## Research

NRMRL has research facilities at its headquarters in Cincinnati, Ohio, and at its locations in Research Triangle Park, North Carolina; Ada, Oklahoma; and Edison, New Jersey. NRMRL's staff includes several hundred scientists and engineers devoted to solving a wide range of environmental problems. Information follows concerning NRMRL's key research areas that support EPA's mission.

### Drinking Water Protection

The U.S. has one of the safest public drinking water supplies in the world. However, current and future challenges — like the emergence of new waterborne diseases, varying source water quality, and increased contamination of ground water — must be met with well-focused research activities. NRMRL's researchers develop, investigate and improve ways to: (1) remove contaminants such as disease-causing microorganisms and chemicals (e.g., arsenic) from source water, and (2) monitor and manage the quality of water in distribution systems. By responding to calls for technical assistance at sites of waterborne disease outbreaks, NRMRL researchers help mitigate the outbreaks while gaining insight into the need for new or modified treatment technologies and methods to design and operate distribution systems. Improved small-system technologies such as membranes and onsite disinfectant generation are being evaluated for their capability to remove or inactivate pathogens such as *Cryptosporidium*.

### Air Pollution

To reduce air pollutant effects on human health and the environment, NRMRL researchers characterize emissions of air pollutants from mobile, stationary and fugitive area sources and evaluate, develop, refine, and demonstrate cost-effective approaches to prevent and control these emissions. The program also develops decision support tools that can be used to evaluate the performance, cost and environmental implications of various air and energy technologies. The main areas of focus are particulate matter and associated co-pollutants, toxic air pollutants, indoor environmental management, global climate change and waste combustion. Efforts focus on a wide variety of sources including landfills, animal feeding operations, power generating facilities, indoor sources, diesel vehicles, and waste incinerators. Research products provide federal, state, and local agencies with information they can use as they implement existing regulations and devise future air pollutant abatement strategies.

The information is also useful for those industries required to meet environmental standards and building owners, school districts, and the general public who are attempting to reduce exposure indoors. NRMRL is also collaborating with other laboratories to understand the characteristics (chemical and physical) and toxicity of particulate matter emitted from various combustion processes. This will help risk managers to target reduction strategies at those sources with the greatest potential for inducing health effects. The control technology program is focused on evaluating integrated solutions that can simultaneously reduce multiple air pollutants. For example, NRMRL is investigating and testing options that can enhance mercury capture at coal-fired power plants using existing technologies such as scrubbers to reduce sulfur oxide emissions.

### Pollution Prevention and Sustainability

Research at NRMRL helps to develop and demonstrate pollution prevention and recycling approaches as well as resource recovery and reuse technologies. NRMRL research includes "green chemistry" projects where investigators are exploring the substitution of cost-effective, ecologically-friendly processes for traditional chemical processes. NRMRL engineers continue to design and refine software that enables manufacturers to make process changes that can improve environmental performance. One such software tool works in concert with commercial process simulators to enable design of processes and solvent mixtures with the least adverse environmental impact. Membrane and adsorption processes are also being studied by NRMRL researchers to improve recovery of reusable chemicals and metals from manufacturing waste streams. From pollution prevention research, sustainability and sustainable development have evolved in NRMRL as new research topics in their own right. Sustainability is the planning and use of resources in communities so that they will be available at equal or greater levels for future generations. Sustainable development is the approach that a community chooses to implement in an effort to remain sustainable. NRMRL researchers are studying and developing tools that facilitate sustainability; beyond this, they are evaluating the benefits such tools provide if applied through community-based environmental protection programs. Pollution prevention solutions, including material and energy efficient technologies viewed from a life cycle perspective (i.e., resource use and environmental impacts of the entire life span of a product), will be essential to meeting sustainable development goals. A full understanding of potential environmental impacts can help local decision makers and stakeholders plan for cost-effective yet resource-efficient approaches to community projects.

### Contaminated Media Remediation

To help clean up the more than one thousand hazardous waste sites that are currently on the National Priorities List, as well as leaking underground storage tanks, oil spills and sediments, NRMRL is developing tools and technologies to understand and remediate contaminants. For example, NRMRL researchers are developing models to assess the fate, transport, and transformation rates of contaminants in soil and ground water. NRMRL scientists and engineers are also demonstrating methods for containment and remediation of contaminants from these sites. Biological methods being investigated include the use of microorganisms and plants to degrade or take up contaminants in soils and ground water. Chemical methods include the use of additives to bind with and reduce the danger of metals in soil. Chemical methods are being combined with physical methods to treat and control contaminants in soil, sediments and ground water. NRMRL researchers are also evaluating how natural

## NRMRL's Research Facilities

### Cincinnati, Ohio

- Land Remediation & Pollution Control Division
- Sustainable Technology Division
- Technology Transfer & Support Division
- Water Supply & Water Resources Division
- Environmental Technology Verification Staff
- Resources Operations Staff

### Edison, New Jersey

- Urban Watershed Management Branch



### Ada, Oklahoma

- Ground Water & Ecosystems Restoration Division

### Research Triangle Park, North Carolina

- Air Pollution Prevention & Control Division

attenuation – the use of natural processes to break down or capture contaminants – can be combined with intensive monitoring to provide cost-effective site clean-up that meets regulatory requirements.

### Watershed Management and Restoration

Watersheds are large-scale natural drainage areas that generally include lakes, rivers, wetlands, and other water bodies and the surrounding landscape. Watershed-scale problems often entail combined impacts to land, water, and air resources; protecting and restoring these resources requires a coordinated effort, based on sound science, by many scientists, engineers, and involved stakeholders. Recognizing the multifaceted nature of watershed problems, NRMRL scientists and engineers are using a holistic approach that draws upon many programs to carry out watershed research and develop best management practices. Such practices include ecosystem restoration and management, pollution prevention and control, onsite sediment remediation technologies, urban storm water management approaches, and combined sewer overflow treatment and control systems. Computer models and decision support systems are being developed by NRMRL to assist watershed managers and communities with ecosystem management and restoration projects. NRMRL is also developing innovative approaches to tracking the sources of pathogens.

### Environmental Technology Verification (ETV)

The goal of the Environmental Technology Verification (ETV) Program is to provide credible performance data for commercial-ready environmental technologies to aid vendors in selling innovative technologies, and to help purchasers and permittees make decisions regarding environmental technologies. The ETV Program is carried out through partnerships with private testing and evaluation organizations. These ETV partners work with EPA and other technology experts to create efficient and quality-assured testing procedures that verify the performance of innovative technologies.

ETV was established in 1995 and completed its five-year pilot period in 2000. Lessons learned in the pilot period are being incorporated into six operating ETV centers which cover technology verifications for a wide spectrum of environmental technologies. Topical areas include: drinking water treatment; air pollution control; advanced monitoring systems; water quality protection; greenhouse gas mitigation; and pollution prevention, recycling, and waste treatment. The efforts of the ETV centers are being guided by the expertise of stakeholder groups which consist of private and public purchasers, permittees at local, state and federal levels, technology devel-

opers and vendors, members of environmental interest groups, and representatives of the financial community.

### Technology Transfer and Technical Support

Informing the regulated community, regulatory and permitting officials, and environmental consultants about the latest advancements in risk management approaches and decision options is vital to the success of EPA's programs. NRMRL conveys this information by producing technology transfer publications, software products, brochures, and by convening technical meetings. In addition, NRMRL scientists and engineers provide expert advice and assistance to environmental managers at all levels of government. Recent outputs have included manuals on pollution prevention, onsite wastewater treatment systems, Brownfields, community-level environmental monitoring, and on specific contaminants such as mercury and arsenic. NRMRL's technical operations staff provides information technology innovation to facilitate improvement of water, wastewater, and hazardous waste treatment technologies.

### NRMRL Leadership

Overall leadership and scientific direction in NRMRL are provided by: Director, Sally Gutierrez; Deputy Director for Management, Clyde Dempsey; Acting Associate Director for Health, Subhas Sikdar; Acting Associate Director for Ecology, Robert Olexsey.

### Additional Information

For additional information about NRMRL, its research programs and products, visit the NRMRL website (<http://www.epa.gov/ORD/NRMRL>) or call (513) 569-7418. Subscribers to the NRMRL Listserve (subscribe at no charge at our website) will receive regular announcements about new products, research highlights, workshops, and solicitations. NRMRL publications can be viewed online and requested at no charge by calling (800) 490-9198.



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Revised February 2006  
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