National Institute of Environmental Health Sciences
Your Environment. Your Health.

Superfund Research Program

The Superfund Research Program (SRP) has provided practical, scientific solutions to protect health, the environment, and communities since 1987. SRP works to learn more about ways to protect the public from exposure to hazardous substances, such as industrial solvents, arsenic, lead, and mercury, which can cause death, disease, and birth defects. These and other toxic substances are found in contaminated water, soil, and air at Superfund waste sites throughout the United States.

As part of the National Institute of Environmental Health Sciences, one of the National Institutes of Health, SRP funds grants on basic biological, environmental, and engineering processes, to find real solutions to hazardous waste problems. In addition, SRP helps train the next generation of environmental health researchers.

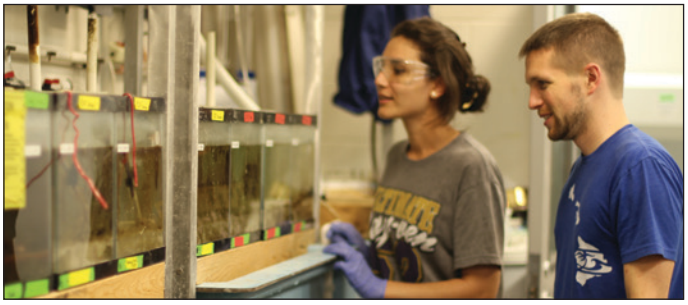

Photo courtesy of the University of Maryland, Baltimore County

Reducing contamination

SRP conducts research to reduce contaminants or keep them from spreading. For example, SRP research has:

- Developed ways to clean up chlorinated contaminants like trichloroethylene from groundwater using solar power. [1]
- Found that switchgrass and its associated bacteria can effectively remove polychlorinated biphenyls (PCBs) from contaminated soil. [2]
- Developed a novel process to bind heavy metals in soil, cementing them together so they cannot migrate into groundwater.[3]
- Discovered a new helper molecule that speeds up the degradation of chlorinated compounds by bacteria.[4]

Protecting human health

As hazardous substances spread through the ground, water, and air, human exposure to them raises risks associated with numerous diseases and serious ailments. SRP-funded research is leading to a better understanding of how these contaminants work, how people are exposed to them, and the dangers they may pose. SRP researchers have:

- Revealed links between exposure to PCBs, diet, and cardiovascular disease, and identified ways that diet can lessen harmful effects of toxic chemicals.[5]
- Discovered associations between early-life exposure to perchloroethylene, and elevated risk of mental illness and teenage drug use.[6]
- Revealed a new genetic link that may explain why some people exposed to arsenic develop skin lesions and get sick while others do not.[7]
- Demonstrated that early-life exposure to polybrominated diphenyl ether — a common flame retardant — may be linked to changes in behaviors related to activity, fear, and anxiety.[8]

Major health consequences studied by SRP

- Neurological disorders
- Cardiovascular and respiratory diseases
- Cancers
- Obesity and diabetes
- Liver diseases
- Impaired fetal development

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Making discoveries that make a difference

Dozens of SRP research programs have improved our understanding of the dangers of hazardous substances and led to better ways to protect our health. A few examples include:

Neurological development: Studies of school children found a link between arsenic in drinking water and diminished intellectual function.[9] Researchers are learning more about the challenges to reducing arsenic exposure from well water,[10] and encouraging testing and treatment to reduce exposure.

Cancer: Some types of dioxins are known cancer-causing agents. Researchers discovered that consuming activated carbon may reduce the health risks associated with exposure to dioxins.[11]

Nervous system: Researchers are using native plants to stabilize and limit the spread of dust contaminated with lead and other metals near mining sites.[12] When inhaled, this dust can damage the nervous system.

Liver disease: By examining how hazardous substances may lead to liver damage, researchers discovered ways that liver inflammation promotes cancer. The findings suggest novel targets that may lead to new cancer therapies.[13]

Creating partnerships that lead to scientific discoveries

A hallmark of SRP is collaboration. The program brings together teams of scientists from major research universities and innovative small businesses with a range of expertise. SRP researchers include biologists, chemists, toxicologists, ecologists, epidemiologists, geoscientists, and engineers. They are required to work closely with local, state, and federal agencies,

Photo courtesy of the University of Arizona

Photo courtesy of Texas A&M University

as well as individuals and communities near hazardous waste sites. This fosters a focus on community priorities and needs, encourages sharing research results and expertise, and maximizes the impact and relevance of SRP studies.

To promote research relevance and maximize the impact of program investments, SRP works closely with its sister programs at the U.S. Environmental Protection Agency and the Centers for Disease Control and Prevention Agency for Toxic Substances and Disease Registry. It also partners with the U.S. Department of Energy and U.S. Department of Defense, as well as the National Science Foundation.

SRP contributes to advancing science

- Grantees have worked at more than 270 hazardous waste sites in 40 states.
- SRP-funded researchers have patented more than 150 inventions to detect and clean up waste.
- SRP has funded more than 1,700 researchers at 160 institutions and small businesses.
- SRP has trained more than 2,000 environmental scientists.
- More than 11,600 peer-reviewed articles have documented SRP breakthroughs.

Small business innovation making a unique contribution

While most SRP grants go to university-based centers, SRP recognizes that much of the nation's innovation comes from cutting-edge small businesses. Two programs — Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) — support the commercialization of innovative monitoring, as well as cleanup technologies and products that can be used at Superfund and other contaminated sites.

New technologies include:

- A slow-release technology that provides a long-term solution that degrades chlorinated contaminants in groundwater.[14]
- A method to remove perchlorate and nitrate from contaminated water, providing safe drinking water to California communities at half the cost of other options and with little waste.[15]
- Microbes that enhance the ability of poplar trees to remove chlorinated contaminants from the soil and degrade them.[16]
- A portable device that detects mercury in solid and liquid samples, replacing complex and costly traditional equipment.[17]

Sharing results to keep you informed

SRP teams actively share research results so cutting-edge breakthroughs are relayed to a wide audience, including scientists, policymakers, and the public.

- **Science Digest:** A quarterly compilation of SRP high-impact topics, research highlights, and leadership activities that is sent to more than 14,000 stakeholders.
- **Research Briefs:** Monthly summaries of SRP research findings are sent to more than 12,500 health and environmental experts.
- **Seminars:** SRP conducts interactive web-based seminars, called Risk e-Learning, each with more than 300 participants from government, industry, and academia. Topics range from introducing new cleanup methods, to communication tools for communities facing environmental health challenges.
- **Connecting with communities:** SRP regularly conducts workshops and training with communities near hazardous waste sites.

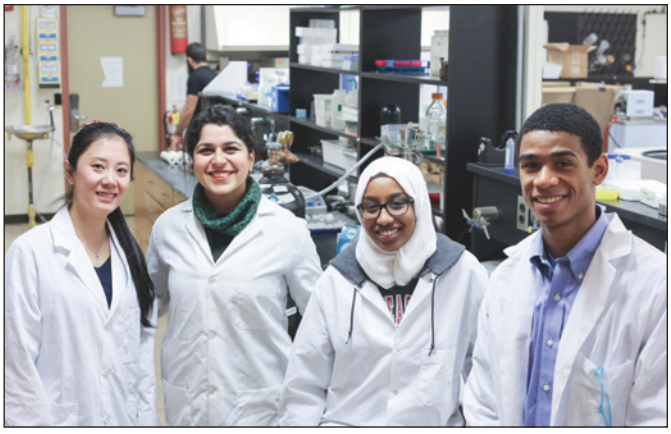


Photo courtesy of Northeastern University

Photo courtesy of the University of Iowa

How SRP works

Recognizing the threat posed by dangerous chemicals and other pollutants left in toxic waste dumps nationwide, Congress created the landmark Superfund program in 1980, to clean up the sites. SRP was created by the Superfund Amendments and Reauthorization Act of 1986, which directs SRP to develop:

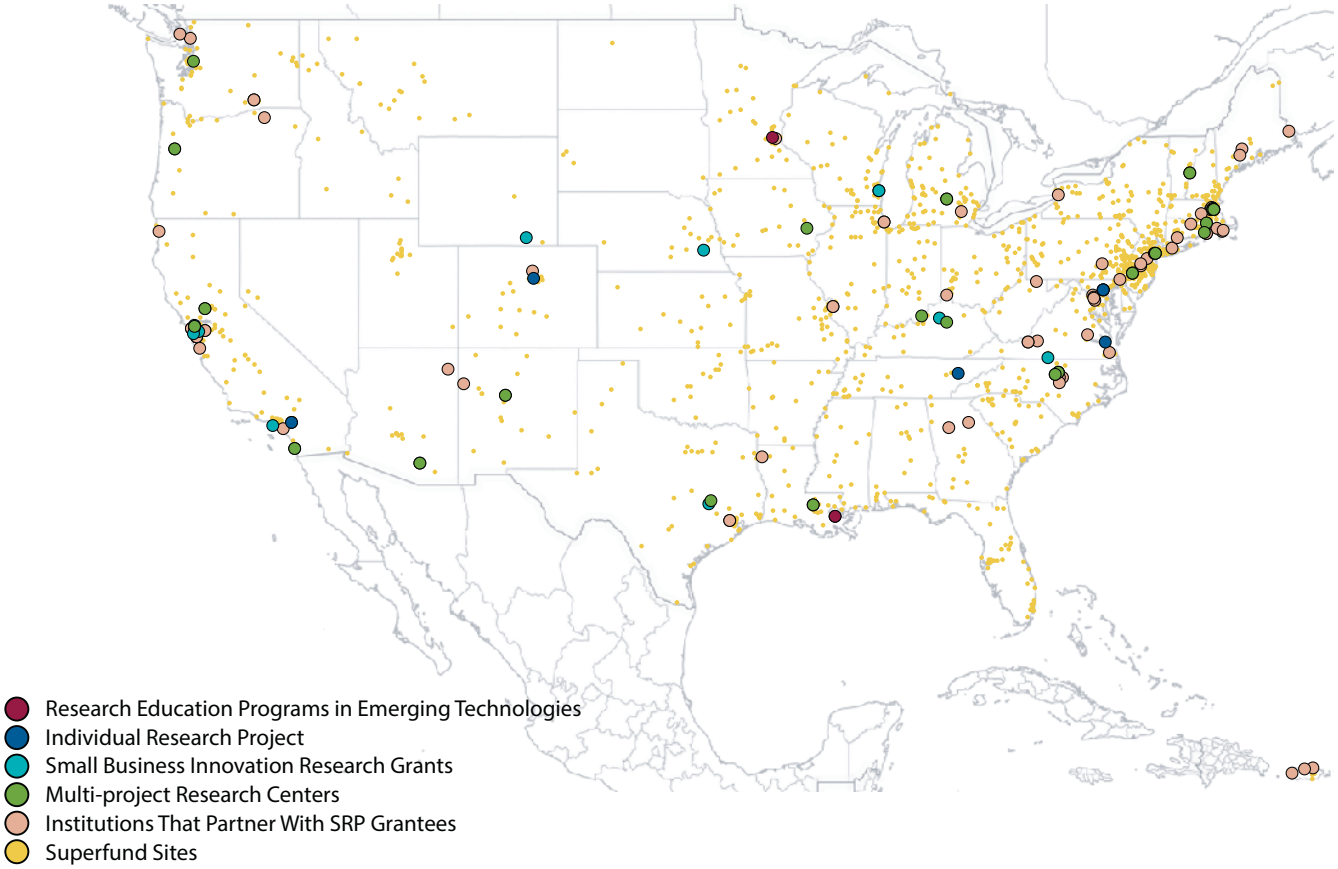
- Advanced techniques to detect, assess, and evaluate the health effects of hazardous substances.
- Methods to assess risks to human health posed by hazardous substances.
- Methods and technologies to detect hazardous substances and their toxicity.
- Basic biological, chemical, and physical methods to reduce the amount and toxicity of hazardous substances.

SRP funds four types of grants to meet research goals

- Multiproject research centers where teams of scientists from different disciplines, usually at major universities, work together to address complex challenges from hazardous waste sites.
- Individual research projects compliment multiproject centers with research that meets critical detection and cleanup technology needs.
- Small business grants fund cutting-edge small businesses to develop monitoring and cleanup technologies.
- Training programs develop occupational health and safety training related to emerging contaminants and clean-up technologies.

Superfund sites and related research and training activities

There are more than 1,700 hazardous waste sites across the country. This map shows their location, along with locations of SRP grantees and the institutions with which they collaborate.



For more information on the Superfund Research Program, visit **www.niehs.nih.gov/srp**.
To subscribe to the SRP monthly research briefs, contact **srpinfo@niehs.nih.gov**.

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