

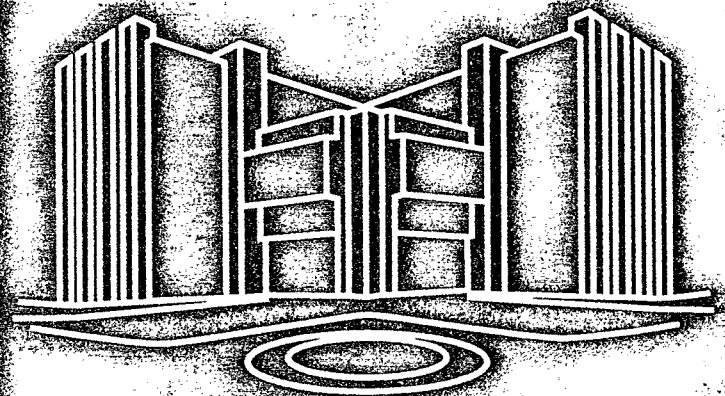
United States
Environmental Protection
Agency

Office of Research and
Development
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**EPA Sustainable
Technology
Division**

Promoting
Cleaner
Technologies and
Tools for
Environmental
Protection



National Risk Management Research Laboratory

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NRMRL

National Risk Management Research Laboratory

Mission

Advance the scientific understanding and the development and application of technological solutions to prevent, control, or remediate important environmental problems that threaten human health and the environment.

Vision

To be world leaders in developing sound technological solutions for reducing environmental risks.

Description

One of five national laboratories/centers within the U.S. Environmental Protection Agency's Office of Research and Development, the National Risk Management Research Laboratory (NRMRL) is headquartered in Cincinnati, OH. Other NRMRL research facilities are located in Research Triangle Park, NC; Ada, OK; and Edison, NJ. A Technology Coordination Office for NRMRL is in Washington, DC.

Sustainable Technology Division (STD)

Mission

Advance the scientific understanding, development and application of technologies and methods for prevention, removal and control of multimedia environmental risks to human health and ecology.

Description

The Sustainable Technology Division (STD) is one of six divisions within NRMRL. Through its three branches, STD plans, coordinates, and conducts a national program of multimedia research, development, and demonstration of cleaner technologies and tools for integrated pollution management for industrial processes, with the priority to reduce or eliminate hazardous, toxic and other pollutant waste generation through pollution prevention. Research includes development of computer based multi-media decision tools for process or product selection and cost-benefit analyses, development of generic process tools (or modular technologies) for cleaner manufacturing, such as green chemistry and engineering, separations technologies, and demonstration and verification of cleaner integrated environmental technologies.

The Division collaborates closely with other NRMRL Divisions, Program Offices, Regions, and other Federal Agencies to develop solutions for cost effective, pollution management alternatives for current and expected compliance issues. STD maintains a close working relationship with trade and professional organizations, industry and academia, to design and develop innovative pollution management methodologies. The Division is also engaged in several international clean technology development projects.

The Division conducts program activities through a variety of mechanisms including: in house research; cooperative agreements with academia and nonprofit organizations; interagency agreements with other federal entities (e.g., USDA, DOE, DOI); cooperative research and development agreements (CRADAs) with the private sector under the Federal Technology Transfer Act of 1986; and contracts with environmental consultants and for-profit companies.

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Systems Analysis Branch (SAB)

Mission

The mission of the Systems Analysis Branch (SAB) is to develop and demonstrate cost-effective decision making tools which integrate environmental solutions, life cycle concepts, value engineering, environmental engineering economics, measurement and pollution prevention (P2) factors. The major technical areas encompassed within the Mission are:

Life Cycle Assessment (LCA)

Efforts in LCA are focused on the development and demonstration of LCA inventory, impact and improvement methodologies. Projects include development and validation of LCA tools for decision makers, and are integrated with other research, development and demonstration within NRMRL. Current projects are in both the Federal and private sectors. Related LCA projects and issues such as P2 factors, standards, and integrated design are included in the LCA program.

Environmental Engineering Economics (E3)

Engineering economic principles are being applied to guide NRMRL research investments in technology. Projects include the survey of costing data and tools that can be applied to making environmental decisions. Cost engineering techniques are being developed and applied across the Laboratory and various costing tools are being integrated into private and public sector decision-making. This area strengthens in-house research activities, supports the program and regional offices, and undertakes fundamental research in the areas of interest to the scientific community.

Chemical Simulation and Measurement

Developing and demonstrating computer-based approaches to achievement of environmentally beneficial changes in processes and products and measuring progress achieved is the focus of this area. Current simulation work includes methods for developing P2, including assessment modules that can be incorporated into process simulators. PARIS II, a program to custom design solvents with desired properties while simultaneously minimizing environmental impacts is being developed. The P2P measurement work is primarily contained in other software under development.

Tools Integration for Sustainable Development

Development and application of environmental decision-making tools to assist the users in determining what each tool does, who should use the tool, where and when the tool should be used, and how to best use the tool is the focus of this area. Problem solving issues for sustainable development require a myriad of environmental tools with other decision-making tools for developing the best solutions. Working with the private and public sectors as "test beds," the demonstration and application of environmental tools will encourage P2 and provide an opportunity for decision-makers to become partners in the development of new and existing environmental tools and methods.

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Clean Processes and Products Branch (CPPB)

Mission

The mission of the Clean Processes and Products Branch (CPPB) is to develop and demonstrate clean technologies for pollution prevention, recycling and remediation, in areas of special interest and competency. These include:

Separations for Removal and Recycling

Membranes for Pervaporation and Vapor Permeation:

Bench and pilot scale demonstration of solvent and other organics recovery from liquid aqueous and vapor phase streams is the objective of this in-house research program. Elucidation of fundamental variables affecting the process as well as the practical application of the technology in remediation and industrial P2 settings are goals. Predictive software to assist potential users in identifying opportunities for using the technology is also being developed using EPA and other pervaporation databases.

Low Cost Metals Adsorption:

In this in-house program, we are identifying and modifying low cost, primarily naturally-occurring materials for adsorbing metals from contaminated groundwater, mining runoff, and industrial processes. We are developing these materials as lower cost alternatives to ion exchange technology. To date, bench scale testing and a pilot test at a military firing range site have been conducted. Copper and lead are target metals. Future work will emphasize recovery and pollution prevention applications (in-process recycling) for the developed adsorbents.

Green Engineering for Chemical Synthesis

Pollution prevention alternatives for the chemical process industry are being investigated through a combination of extramural and in-house projects. Improvements to oxidation chemistry which include better catalysts, biosynthesis/chemical synthesis combination pathways, and photoreactions, are special areas of concentration. In addition, the use of supercritical carbon dioxide as reaction media, solvent and extractant are being explored.

Solvent and Coatings Alternatives

Substitutes for chlorinated solvents are being sought through a largely extramural program. Applications of concern include parts cleaning, painting and depainting. Aqueous cleaners, low VOC and powder coatings, mechanical substitutes, and supercritical carbon dioxide are some of the substitutes being investigated.

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Multimedia Technology Branch (MTB)

MISSION

The Multimedia Technology Branch's (MTB) mission is to develop, demonstrate and evaluate timely and integrated innovative engineering and scientific approaches to reduce air, water and land toxic pollution generated by the production, processing, and use of materials. The major research areas for the MTB are:

Common Sense Initiative (CSI)

This initiative is directed toward finding better, cheaper and faster ways of achieving environmental improvement through a stakeholder-based dialogue in six specific industrial sectors.

Metal Finishing Prevention Technology

The Research and Technology Workgroup of the Metal Finishing Subcommittee of the EPA Common Sense Initiative is focusing much of its attention on the development and demonstration of innovative, low cost technologies designed to improve the performance of the industry and achieve cost-effective pollution prevention results with regard to chrome emissions. Also, work is ongoing for the Approaching Zero Discharge project where

technologies are evaluated in metal finishing shops.

Technology Verification Work

The Environmental Technology Verification Program (ETV) is evaluating the feasibility of a private-sector approach to "technology verification" in an attempt to reduce the risk to small business of adopting new environmental control processes. One of the pilot programs funded under ETV is a fully private-sector approach, administered by the Civil Engineering Research Foundation and overseen by the Multimedia Branch.

Rapid Commercialization Initiative (RCI)

The Rapid Commercialization Initiative (RCI) is part of the Administration's efforts to build cooperative interactions between the private sector, states, and federal agencies to advance the national environmental technology strategy and to bring environmental technologies to market more rapidly and efficiently. Agencies/Associations participating in RCI are: Dept. of Commerce, Dept. of Defense, Dept. of Energy, Environmental Protection Agency, Southern States Energy Board, Western Governors Association, California Environmental Protection Agency. RCI is an attempt to address impediment(s) that innovative environmental technologies encounter when going from demonstration to commercialization

and thus, to speed up the process. RCI is focusing on four technology areas: 1) Avoidance; 2) Control; 3) Monitoring and Assessment; and 4) Remediation.

Butte Mine Waste Technology Program

The Butte Mine Waste Technology Program evaluates and demonstrates new and innovative technologies for abating the environmental consequences of ore mining and milling activities. This program is a joint effort with the Department of Energy's Western Environmental Technology Office in Butte, Montana. The multimillion dollar program receives technical direction from the MTB.

Metal Forming

The MTB is managing several projects funded under the Agency's ETI Program that are directed towards the development of P2-based manufacturing technologies for metals forming. These projects include alternative surface cleaning technologies to replace hazardous chemical solvents; reduction/elimination of casting waste; developing alternatives to the current process of demagging with chlorine gas; intelligent control of the cupola furnace to optimize operation for minimum pollution potential; and establishing best practices for pollution prevention in the use of metal working fluids.

Lead Paint/Lead Soil Abatement

The NRMRL Lead program complies with one of the ORD Strategic Plan Objectives, specifically, Provide Common Sense and Cost-Effective Approaches for Preventing and Managing Risks. With a focus on evaluating lead paint abatement and lead in soil removal technologies, this program continues to seek out the most cost-effective of these technologies without compromising the protection of public health. Proof of concept(s) demonstrations evaluating lead paint abatement technologies have been conducted in and around residential housing in Buffalo, NY. Lead paint abatement research will continue on residential housing in Ohio. NRMRL is also conducting bench scale in-house studies to adapt gravity separation processes and a flotation process for lead particle removal from urban soils. In addition, study on the feasibility of *in-situ* fixation of lead for reduced bioavailability is being conducted.

Base-Catalyzed Dechlorination

The base-catalyzed decomposition (BCD) process is a chemical dehalogenation technology developed by NRMRL in Cincinnati, OH. Its effectiveness continues to be demonstrated around the world in various pilot-scale and semi-commercial plants.

Source Reduction Review Program (SRRP)

This research is a continuation of the efforts first identified in the Agency's Source Reduction Review Project. Now, with the Common Sense Initiative and general Agency policy, all regulatory efforts must first consider the pollution prevention opportunities and possibilities while maintaining strict environmental standards. This research will be conducted in direct consultation with the various Common Sense Initiative Industry Subcommittees. Beyond the Common Sense Initiative industrial categories, the research will focus on needs within the pulp and paper industry and the industrial laundries industry. The identification of research needs will be a collaborative one with inputs from several sources, largely outside the government. The focus of all research to be conducted in this area will be in pollution prevention, i.e., source reduction and/or recycle/reuse with treatment options considered lastly.

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