

NRC-CMRC

*Biotechnology
Research Institute*

Science
at work for
Canada

*Environment Sector
Your Partner for Achieving
Sustainable Development*



National Research
Council Canada

Conseil national
de recherches Canada

Canada



The Environment Sector

of the NRC's Biotechnology Research Institute responds to the complex challenges facing businesses in terms of environmental protection and eco-efficient industrial production.

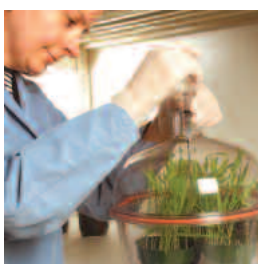
Today more than ever, every organization is duty bound to reduce the risks that its activities create for the public's health and the ecosystem. Pollution prevention and control now form a part of good management practices.

Contaminated effluents treatment, waste management, battle against global warming and for eco-efficiency: the challenges are such that innovative solutions at the cutting edge of technology are necessary.

Our Experience at Your Service



- Whether it is a question of reducing the effects of greenhouse gas emissions, the greening of industrial operations or value-added renewable materials, our 100 researchers, engineers and technical staff can help you find solutions.



- Oriented towards sustainable development, our experts can also help you evaluate the impact your products will have on the environment as well as fine-tune new processes, cleaner and less toxic for human health.



- Specializing in microbiology, chemistry, genetics, biochemistry, eco-toxicology, electrochemistry engineering and nanotechnology, the skill and expertise of our researchers have earned them a solid international reputation on the scientific scene.



Biomass

Climate Changes

Bioconversion

Environment

Environmental Protection

Ecosystem Surveillance

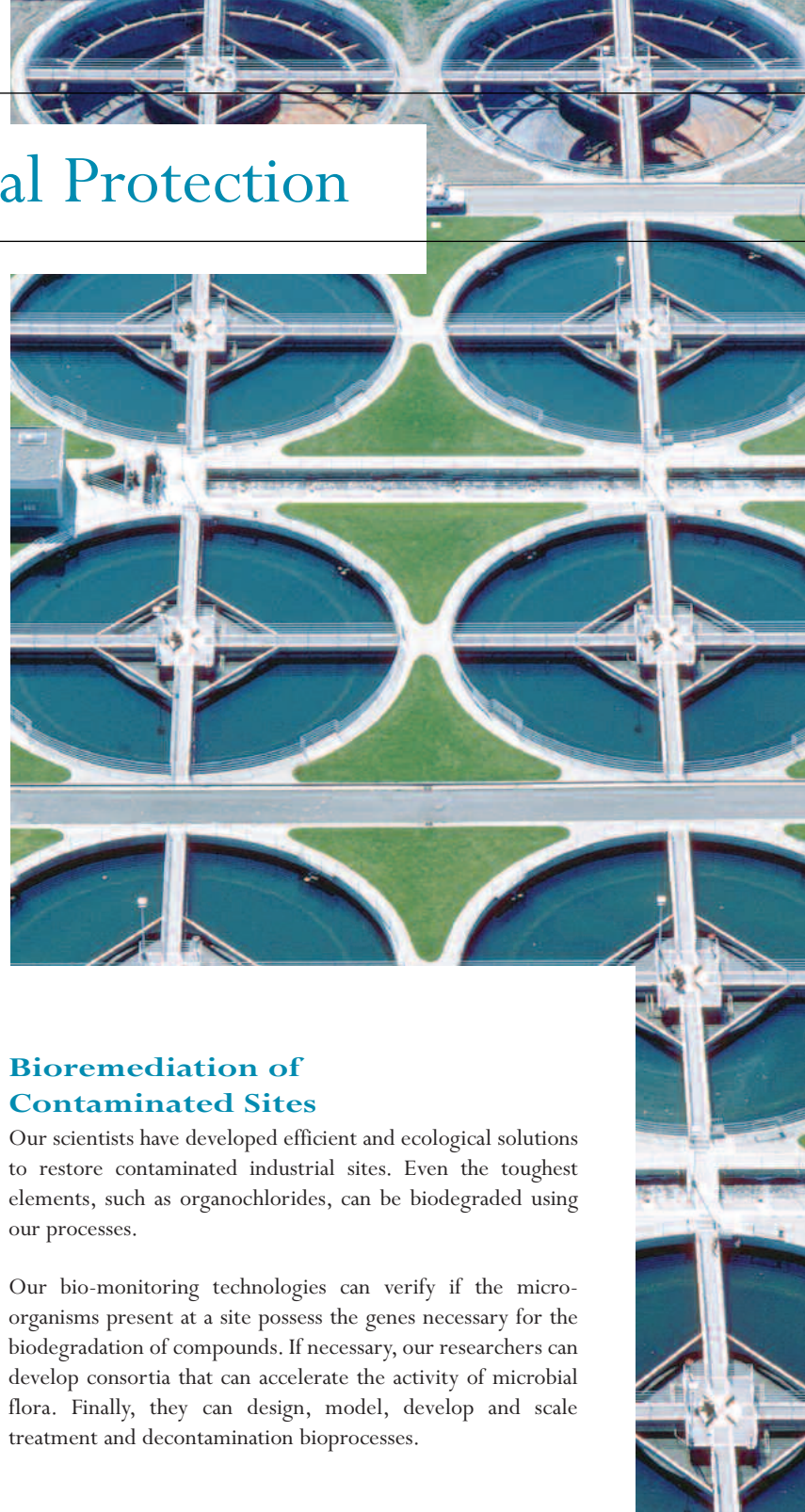
The NRC-BRI researchers have developed molecular tools able to isolate, observe and quantify micro-organisms present in natural environments. The microbial community of an environment can be studied and its response to diverse environmental factors can be evaluated by extracting DNA from a water or soil sample to verify the presence of specific genes and, if necessary, confirm their activity.

Therefore, it is possible to ensure the tracking of biodiversity over time and to facilitate the analysis of the natural cycle of carbon, sulphur, nitrogen and other nutritive elements present in the same ecosystems. These studies have proven very useful for evaluating specific microbial activity or the environmental impact of diverse phenomena disrupting the environment.

Detection of Pathogens in the Environment

Sensors developed by our researchers very rapidly detect the presence of viruses, microbes or other bio-molecules no matter what the medium. These sensors fall into two categories: DNA chips and biosensors that emit optical or electric signals. The latter represents one of the first concrete applications of nanotechnology in Canada for biosensors.

These tools are extremely useful for tracking infectious diseases, for quality testing of fresh water or for tracking the evolution of a bioprocess.



Bioremediation of Contaminated Sites

Our scientists have developed efficient and ecological solutions to restore contaminated industrial sites. Even the toughest elements, such as organochlorides, can be biodegraded using our processes.

Our bio-monitoring technologies can verify if the micro-organisms present at a site possess the genes necessary for the biodegradation of compounds. If necessary, our researchers can develop consortia that can accelerate the activity of microbial flora. Finally, they can design, model, develop and scale treatment and decontamination bioprocesses.



Eco-Efficient Industrial Production

Biomass Conversion

As landfill sites in Quebec and Canada quickly reach capacity, several municipalities and industries are looking for solutions to eliminate their waste products.

Our team constantly improves anaerobic digestion processes that allow for the transformation of 90% of residual organic materials into a biogas that can be converted into electricity. Our researchers enjoy international experience in the design, modeling and control of anaerobic digestion processes. Not only does this solution reduce reliance on fossil fuels by providing a renewable energy source, but it also prevents methane, typically released by buried waste, from escaping into the atmosphere.

The NRC-BRI team is also working on the development of value-added processing of different renewable materials including agricultural and forestry residues. Our enzymatic and microbial bioprocesses allow for the transformation of the renewable material into diverse value-added products (new substances, biomaterials, biocomposites, natural fibres, etc.).

Sustainable Industrial Processes Development

In collaboration with industry, our team has developed biocatalysts that convert organic material into innovative products. These new processing approaches reduce energy and primary materials consumption in addition to limiting waste production, pollution, and greenhouse gas emissions.

Our researchers have collaborated in the development of hydrocarbons with low levels of sulphur and bio-pesticides free of danger to the environment. They have also created a set of enzymes able to convert diverse organic materials into pure lactones and enantiomers that are valuable intermediates in the synthesis of nylon, plastics or pharmaceutical components. In addition, our team has identified an enzyme capable of replacing a chemical stage in the production of antibiotics.



Real Time Process Control

Monitoring techniques that rely on the measurement of on-site fluorescence and sophisticated statistical analysis allow our chemists, engineers and biochemists to control production or treatment processes in real time, using a non-invasive method. These techniques allow for the continual measurement of compounds.

In addition, our computer science experts have developed software applications permitting remote tracking and control of processes. Notably, this system has allowed for the successful tracking of concentrations of nitrates in groundwater.

Eco-Efficiency Evaluation of a New Product or Process

Our concern is to determine the eco-efficient character of new products or processes before they are sold or introduced into the ecosystem.

With the help of eco-toxicological tests, biochemical markers and environmental chemical analysis, our researchers can evaluate the fate and impact of various compounds on human health and on ecological receptors. These tools prove extremely useful for analysing the life cycles of products.



What Our Clients Say

- “Since the 80s, Sanexen has had the opportunity to work with NRC-BRI on various projects. The quality of resources put at our disposal by NRC-BRI is exceptional. Montréal can consider itself lucky to be home to such a world class centre.”

Jean Paquin, Vice President
Sanexen Services Environnementaux Inc.

- “The DNA chips and other molecular tools developed by NRC-BRI researchers contribute to the advance of environmental research and a better understanding of microbial populations.”

Tom Edge, Physical Scientist
Environment Canada

- “The specialists in environmental chemistry who work at NRC-BRI have realised revolutionary work allowing us to better understand the aspects of the degradation of explosive substances and to facilitate their biodegradation.”

Herb Ward, President of the Scientific Committee
Strategic Environmental Research and Development Program (SERDP)

- “Collaborating with NRC-BRI allowed Biophage to develop a new biosensor technology. Together, we have created business opportunities in the health, national security and environmental domains.”

Rosemonde Mandeville, President and Chief of Scientific Management
Biophage Pharma Inc.

Collaborate with Our Team

Flexible and dynamic, our team tailors its collaboration approaches to the needs of its partners:

- Shared costs, risks and benefits collaboration agreements
- R&D, service and equipment rental contracts
- Licensing agreements to use our patented products or technologies

Contact us!



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NRC's Biotechnology Research Institute



The NRC's Biotechnology Research Institute is the largest biotechnology research centre in the country. Multidisciplinary teams are evolving within three research sectors: Health, Environment and Bioprocess. In addition, NRC-BRI is home to an Industry Partnership Facility (IPF), a rental complex for R&D companies working in biotechnology. The IPF's strategic location allows these companies to benefit from NRC-BRI's expertise as well as state-of-the-art technical facilities.



**Biotechnology
Research
Institute**

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