



## Biofouling and Biocorrosion Facilities

CNL's Biofouling and Biocorrosion Facilities (BBF) located at its Chalk River Laboratories (CRL) evaluate issues related to corrosion and fouling by micro-organisms. This facility uses a multidisciplinary approach to address microbial involvement in materials' degradation and remediation, including the use of traditional culture methods, modern genetic microbial identification methods and electrochemical methods.

Past work has incorporated the use of various "bioreactors" to culture microbial populations isolated from failed components allowing the use of on-line electrochemistry methods to assess the rate of corrosion. In addition, various microbial genetic techniques have been used to assess the activity of the microbial populations.

Microbial involvement in materials degradation spans a range of materials, chemistry and environments. In collaboration with CNL staff involved in chemistry, materials and engineering, tests are devised that aid in assessing microbial viability in a range of environments. Tests also help to evaluate the risk for materials degradation and prospects for remediation as required.

It has long been established in the literature that up to 98% of the micro-organisms active in an environmental location cannot be isolated and cultured in the laboratory. In order to be able to characterize this population of uncultivable bacteria, CNL's BBF lab has developed a series of methods based on microbial genetics that do not require the bacteria to actually be cultured. In addition, the use of various genetic markers allow the activity of a variety of bacterial populations to be determined.

The staff within the BBF have expertise in biotechnology, microbiology, general chemistry and biochemistry. The Biofouling and Biocorrosion Facilities are currently working in collaboration with staff from the Environmental Technologies Branch and the Waste Disposal Technology Branch located at Whiteshell Laboratories to provide a suite of techniques which address microbiological issues relevant to the proposed Geological Waste Management Facility at CRL.

### Equipment used within BBF:

- Epifluorescence microscope
- Polymerase chain reaction (PCR) machine
- Denaturing gradient electrophoresis (DGGE)
- Bioreactors
- AC and DC electrochemical analysis
- Anaerobic chamber

