



**US Army Corps  
of Engineers®**

Engineer Research and  
Development Center

# Assessing Sites for Microbial Contamination

## Description

ERDC Environmental Laboratory (EL) can assess sites believed to be contaminated with microbial infectious agents and can also monitor these sites for customers within the Corps of Engineers and other agencies. ERDC-EL rapidly detects and identifies microorganisms in environmental matrices using traditional cultural methods, molecular methods (cellular fatty acid profiles and 16S ribosomal DNA sequence analysis), and emerging electrospray mass spectrometric approaches.

## Capabilities

ERDC-EL is able to assess sites believed to be contaminated with microbial infectious agents and to rapidly identify microbes so that the site can be monitored. ERDC-EL continues to improve and use rapid, high-throughput methods to detect and identify microorganisms in environmental matrices. Research and development in this area focuses on the use of emerging mass spectrometry methods and DNA analyses. ERDC-EL can conduct studies for Corps of Engineers Districts and other federal agencies on a reimbursable basis to assess microorganisms in environmental matrices.



## Supporting Technology

ERDC-EL is currently developing and improving methods for detecting and identifying microbes. In the first method, cellular fatty acids are determined using gas chromatography/mass spectrometry (GC/MS). This method takes less than 24 hr. ERDC-EL is working with the Baltimore District, U.S. Army Corps of Engineers, the U.S. Army Medical Research Institute of Infectious Diseases, and Sentinel, Inc. to increase the taxonomic resolution of this approach. The second method is based on 16S rDNA sequence analysis, which is slower and more expensive, but gives a higher level of taxonomic certainty. The presence of specific known pathogens can be determined using high-density DNA arrays and their levels in samples can be determined using a quantitative polymerase chain reaction (PCR). A third approach, based on an emerging detection method being developed at Aberdeen Proving Grounds, is the use of electrospray tandem mass spectrometry. This method can produce data that are useful for assessing environmental risk.

## Benefits

ERDC-EL can extend its chemical cleanup mission to sites contaminated by infectious agents because these tools enable rapid site assessment and the ability to monitor the efficiency of remedial actions.

## Success Stories

- ERDC-EL has used quantitative PCR to determine the levels of pathogenic *Escherichia coli* 0157:H7 in sediments. This method has been shown to be sufficiently sensitive to ensure compliance with current law.
- The Baltimore District, U.S. Army Corps of Engineers has used the fatty acid profile approach to close out a soil remediation site in the Baltimore area thought to be a former dumpsite for microbiological research.

- ERDC-EL is using a combination of the above methods to ensure air quality for currently deployed troops.

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