



# Site Characterization Guidance in Electronic Format

## Introduction

In addition, there are more than 20 software packages that can be downloaded from the CD-ROM. They include the four programs highlighted below, plus several modeling programs for use in contaminant transport studies, vadose zone leaching, wellhead protection, and other environmental applications.

The four software programs highlighted here are products of research at the National Exposure Research Laboratory (NERL) Environmental Sciences Division (ESD) in Las Vegas. The ESD is presently expanding the CD-ROM to include more documents, links, and software, as it leads the Agency effort to take pertinent scientific documents from the shelf to the computer.

## ASSESS

ASSESS is an interactive program designed to assist the user in statistically determining the quality of data from soil samples taken at a hazardous waste site. ESD scientists have developed this public-domain, user-friendly Fortran program to assess precision and bias in the sampling of soils. The total error in a sampling regimen is the sum of measurement variability and natural variability of the contamination. It is the field scientist's challenge to mitigate the measurement variability by careful sample-taking, thoughtful sampling design, and the use of recommended quality assessment samples. The greatest potential for error, both random and bias, is in the sampling step. Field conditions, tool contamination, operator differences, all can affect variability and bias in a sample before it gets to the analytical step.

The value of ASSESS is its ability to detect and isolate error at critical steps in the sampling and measurement function.

## Geo-EAS

The ESD can meet the needs of scientists who work with spatially distributed data. The complexity of contaminant distribution and migration at hazardous waste sites requires a mathematical method that is capable of interpreting raw data and converting them to useful information. Geostatistics began in the mining industry and has grown to include applications ranging from microbiology to air monitoring.

Though the application of geostatistics is crucial to the delineation of buried contaminants, not every field scientist can be expected to develop customized geostatistical algorithms for individual sites. Geostatisticians at the ESD developed a software package, Geo-EAS in 1988. The current version, Geo-EAS 1.2.1, was released in 1990. This program offers the environmental scientist an interactive tool for performing two-dimensional geostatistical analyses of spatially distributed data.

## Scout

The complexities of correct data interpretation challenge environmental scientists everywhere. Environmental software packages have been developed to address the various needs of data analysts and decision makers. One frequent need is for the reliable determination of outliers in a data set. Scout is a program developed to identify multivariate or univariate outliers, to test variables for lack of normality, to graph raw data and principal component scores, and to provide output of the results of principal component analysis. Scout provides interactive graphics in two and three dimensions. There are many advantages of a graphical display of data in a multidimensional format: it allows a quick visual inspection of data, it accentuates obvious outliers, and it provides an easy means of comparing one data set with another. Scout has the flexibility to allow viewing and limited editing of a data set. Scout features online help, with a "built-in" users guide. Scout is a valuable addition to the library of environmental software packages available from the ESD.

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## Geophysics Advisor Expert System

The ESD is concerned with the selection of correct monitoring methods. Sometimes the best technique is not easily discernible. This is particularly a problem in sampling and monitoring complex matrices, like soil and sediment, and when buried structures and plumes are hidden from sight. The characterization and remediation of a hazardous waste site involves several disciplines, from experimental design to analytical protocol.

Individuals who decide upon methods and who are responsible for approving contractor suggestions need an easy-to-use text or computer program that will guide them in expensive and decisive actions.

The decision to use geophysical methods and which geophysical method to use is a challenge to site managers. The ESD, in cooperation with the U.S. Geological Survey, has developed an expert system, Geophysics Advisor, to aid these personnel in critical decisions about geophysical methods that may impact the quality and reliability of their data. This program is built on a foundation of expertise in applying geophysical methods to complex hazardous waste sites. The current version, Geophysics Advisor 2.0, is designed to meet the needs of non-geophysicists to assist and educate them in their interaction with geophysicists. It is not intended to replace the expert advice of competent geophysicists.

## Reference

To obtain the Site Characterization Library, Volume 1: Release 2.5 CD-ROM (EPA Number 600C02002), contact the National Service Center for Environmental Publications.

P.O. Box 42419  
Cincinnati, OH 45242-2419  
Tel.: (800) 490-9198  
Fax: (513) 489-8695  
[www.epa.gov/ncepihom/index.htm](http://www.epa.gov/ncepihom/index.htm)

## For Further Information

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