

Precision Excavation

EVS has developed an innovative combination of technologies that results in extremely efficient and cost-effective approaches to facilitate the removal of soils contaminated with radionuclides.

PROBLEM/OPPORTUNITY

The numerous locations across the United States that have soils contaminated with radioactive wastes represent legacies of the Cold War. A very significant factor in the multibillion dollar cleanup estimates for these sites is the high unit cost for transportation and final off-site disposal. Traditional excavation approaches are based on discrete soil boring results that are used to define a “block” of soil for removal. These approaches often result in unnecessary expenses when clean soils are sent off-site for disposal, and contaminated areas may be overlooked. New methodologies were needed to minimize soil disposal volumes, while ensuring that the sites are left contamination free. Because delays in large-scale excavation projects are extremely expensive, any attempts to reduce unnecessary disposal volumes must avoid major disruptions during the process.

APPROACH

The precision excavation approach involves the removal of contaminated soil in shallow lifts, which are defined as excavation progresses, rather than in a predetermined block. Recent advances in sensor devices, field analytical procedures, global positioning systems (GPSs), and Internet-based data management/decision support technologies have facilitated this process. Implementation of precision excavation combines the information of discrete soil boring results with data from frequent surface gamma radiation walkover surveys. The results of the surveys are recorded with position data using GPS signals. The analysis of discrete sample results and gamma walkover data produces a preliminary estimate of the contamination volume, plus an initial shallow footprint of the contaminated soil to be removed. After the first lift of contaminated soil has been removed, a sequence of gamma walkover surveys is rapidly analyzed to direct the excavation

process until the site’s cleanup criteria have been met.

EVS has developed technical, dynamic, Internet-based web sites to serve as data organization, analysis, and dissemination centers to keep key stakeholders and decision makers informed. The numerous organizations and individuals involved in these cleanup projects are often located across the country. Use of these web sites guarantees access to the most current site information. During the precision excavation process, daily field survey data sets are electronically transferred from the site to EVS for analysis as well as a generation of maps that indicate the next lift of contaminated soils to be removed. The web sites have controlled access that protects draft and time-sensitive technical information results.



Application of precision excavation at the Ashland 2 FUSRAP

One of the first applications of the Internet-based data integration approach was at the Painesville, Ohio, Formerly Utilized Sites Remedial Action Program (FUSRAP) site. Soils at Painesville were contaminated with radioactive wastes left behind from the early development process for atomic weapons. The project was very successful in linking federal agencies, private contractors, and state

regulators at locations across the country. Improved project management and reductions in off-site waste disposal volumes earned EVS a U.S. Department of Energy Pollution Prevention Award in 1996.

More recently, the precision excavation process has been applied to other FUSRAP sites under the management of the U.S. Army Corps of Engineers. At the Ashland 2 site near Buffalo, New York, an initial evaluation of project records shows more than \$10 million in cost savings resulted from the use of precision excavation over traditional block excavation methods. Federal and state regulators had immediate access to the data being used to support the excavation process. The success of the precision excavation at the Ashland site has resulted in its use at several other FUSRAP sites.

FUTURE

Precision excavation techniques are constantly being improved for soils contaminated with radioactive or chemical waste. Enhanced techniques will result from improvements in sensor and data analysis technologies. Improvements in web-based communications and data management techniques will also be incorporated. Knowledge gained from previous and ongoing applications will be documented and publicized for use by other organizations.

COMMUNICATION OF RESULTS

Papers on EVS's accomplishments with precision excavation have been presented at numerous conferences. In March 1999, "Precise Excavation – An Alternative Approach to Soil Remediation," was presented at the National Defense Industrial Association Symposium in Denver.