TECHNICAL ASSISTANCE REQUEST
ASHTABULA CLOSURE PROJECT
ACP 03-01-3

APPLICABILITY OF FIDLERS TO SUPPORT DIG-FACE CHARACTERIZATION OF URANIUM-CONTAMINATED SOILS DURING EXCAVATION

SECTION 1 -- APPROVALS FOR TECHNICAL ASSISTANCE

______________________________ Contractor Site Representative	______________________________ OST/HQ Program Manager
______________________________ DOE Site Manager	______________________________ OST/HQ Office Director
______________________________ DOE OH Manager	

SECTION 2 -- BACKGROUND AND PROBLEM DESCRIPTION

As the Ashtabula Closure Project (ACP) nears completion of environmental restoration, remediation of contaminated soils remains a significant component of the overall program. All soils above the site's cleanup criteria will need to be excavated and disposed of off-site. The principal contaminant of concern is total U (cleanup criteria of 30 pCi/g averaged over 100 square meters, with no samples to exceed 90 pCi/g). Soil excavation has taken place at the site in the past so there is a well-established baseline process for conducting this work. Therefore, any real-time characterization technology needs to augment the current standardized process.

The ACP has a need for a technology that can support real-time uranium characterization in soil during excavation. Much of the contaminated soil excavation that remains is subsurface and at depth. Excavating these soils will require significant layback that will incorporate clean soils. The ACP needs to be able to segregate clean soils from contaminated during the course of excavation to minimize waste disposal streams and overall remediation costs. Building upon much of the experience derived by Fernald during their development and use of real-time characterization technologies, the ACP is currently evaluating the extrapolation of these soil characterization technologies for use at the ACP site. If successful, these technologies may prove useful for cost-effectively delineating uranium soil contamination during excavation.

A TA Team assembled at the ACP in late June addressed uncertainties associated with real-time characterization of uranium-contaminated soils in the report "*Recommendations to Address Contaminated soils, Concrete, and Corrective Action management Unit/Groundwater Contamination at Ashtabula, Ohio*". The approach selected by the TA team focused on integrating "real-time" data collection into the excavation process, and using resulting data to address the uncertainties inherent in the actual footprint of contamination. In this approach, areas would be identified that are known to require remediation based on all available current information. Excavation would be conducted sequentially with "lifts" or "layers" of soil removed. After excavating each lift, data collection would take place over the exposed dig face to determine the contamination footprint within that dig face.

A variety of technologies, such as sodium iodide (NaI) and high purity germanium (HPGe) detectors, can potentially be used to scan surface soils and provide the real-time characterization information the site will require to segregate soils during excavation. The in situ HPGe gamma spectroscopy measurement system and large-crystal mobile NaI scanning systems (e.g., Gator, RSS, RTRAK, EMS) have been deployed successfully at Fernald. FIDLER (Field Instrument for the Detection of Low Energy Radiation)-type systems combined with GPS/GIS are commercially available systems that have been used for similar applications by the FUSRAP program. It is likely that some combination of these systems will be appropriate for ACP needs.

SECTION 3 -- SCOPE

The scope of recent and proposed TAs at the ACP centers on recommendations contained in the June TA report and builds upon FY02 TA activities for deployment of the RSS and proposed FY03 activities for deployment of a NaI-Tipped GeoProbe System. The focus of this TA Request is the use of FIDLERs to support dig-face characterization during soil excavation. Under ideal conditions hand-held NaI systems such as a 2x2 sensors can achieve detection limits of approximately 40 pCi/g for depleted uranium with a 2 second acquisition time (MARSSIM, 1997). Based on the results of the RSS deployment at the ACP, these detection limits can be further reduced for uranium by controlling background through judicious use of shielding on the detector, by using a thin crystal detector such as a FIDLER or mini-FIDLER system, and/or by post-processing data through spatial averaging (equivalent to increasing effective count times).

The current strategy is for soils generated during the excavation process to be segregated by whether they have exceeded the cleanup criteria based on real-time data. Clean soils could be used for backfill, assuming sufficient information was collected to satisfy closure requirements. To be successful, this approach would require data collection technologies with sufficiently low detection limits to support the segregation of soils at 30 pCi/g for total uranium, and an excavation logic that provides sufficient time for dig-face screening to take place without jeopardizing excavation efficiency.

In order for real-time characterization technologies, i.e., FIDLERs, to be used successfully at the ACP, technical assistance is needed to support on-site activities in the following areas:

- Development of standard operation procedures for using FIDLERs during soil excavation
- Development of an acceptable method for demonstrating compliance with cleanup requirements is met for soil segregated as clean.
- The optimal configuration of technologies will need to be identified, their performance characteristics documented for the site, and site-specific standard operating procedures (SOPs) developed.
- Trigger levels will need to be determined that can be used for reliably segregating clean soils from contaminated soils.
- Appropriate lift sizes will need to be determined and an excavation logic will need to be developed for the site that will govern how excavation work is conducted.

SECTION 4 -- SCHEDULING REQUIREMENTS

Consistent with the site's soil remediation schedule and the sequence of work, it is important that the requested TA be initiated during Summer 2003. Complying to this schedule will allow ACP to adhere to scheduled soil excavation activities beginning in late FY03 and early FY04.

SECTION 5 -- BENEFITS

This approach allows spending to focus on remedial efforts rather than additional characterization, provides an efficient means for addressing uncertainties present in the contamination footprints, minimizes the possibility that clean soils are inadvertently excavated for off-site disposal, and provides at least some of the information that would be required for reusing excavated clean soils as backfill. Moreover, from a management perspective, this approach saves costs by reducing the volume of soil that needs to be shipped off site and also saves time given that real-time instruments support excavation.

The cost savings can be derived from two source.

1. First, there is a cost savings associated with reduced analytical costs for XRF or Gamma Spectroscopy analysis of soil sample at $82 per sample.
2. Second, there is potentially a significant cost savings associated with reducing the amount of soil shipped off-site for disposal as LLW at $135/cy.

The cost estimate for this TA is ca. $50,000. This estimate includes technical support from one or more national laboratories, including ANL, EML, INEEL and ORNL, and FIU beginning in summer 2003. Technical support will focus on deployment, calibration, operation and maintenance of the sensor system, as well as data evaluation and subsequent evaluation and reporting.

Cost savings or return on investment (ROI) is dependent on successful operation of the system at the ACP. Cost savings will initially result from savings in laboratory costs. It is estimated that the use of FIDLERs will reduce the number of samples taken for XRF analysis by ca. 10-15 per day, which corresponds to a savings of ca. $1000 per day. Based on this estimate, it would take ca. 50 days of operation to return the initial investment. Additional cost saving should result from a reduction in the amount of soil shipped off-site for disposal. At the disposal rate of $135/cy, reducing the amount of soil shipped for disposal by 370 cy, would cover the cost of the TA. Based on remediation an estimated 33,000 cy of contaminated soil over a two year period, the cost savings and subsequently the ROI could be significant.

SECTION 6 -- DELIVERABLES

A summary of operation activities, successes and failures, will be presented to DOE and Contractor management as a draft final status report at the conclusion of the field work.