Department of Energy

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Fernald Closure Project
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MAY 16 2006

Mr. James A. Saric, Remedial Project Manager
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77 West Jackson Boulevard
Chicago, Illinois 60604-3590

DOE-0123-06

Mr. Thomas Schneider, Project Manager
Ohio Environmental Protection Agency
Southwest District Office
401 East Fifth Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

SAMPLING METHODOLOGY FOR COLLECTING SOIL/SEDIMENT CORES BENEATH WATER IN SUBMERGED SOIL CERTIFICATION AREAS AND CERTIFICATION-IN-PROGRESS AREAS

References:

1) U.S. EPA, Office of Water, Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual, 2001, EPA-823-B-01-002

2) U.S. EPA, Office of Emergency Response, Sediment Sampling Standard Operating Procedure, 1994, SOP #2016

3) Ohio EPA, Division of Surface Water, Sediment Sampling Guide and Methodologies, Second Edition, 2001

Soil and sediment core samples need to be collected beneath the water's surface for re-certification of specific certified areas that may be under water for an extended period of time in the near future. This condition precludes the standard soil sampling approach used to conduct certification. In addition to re-certification sampling, other specific areas with similar submerged conditions need to be sampled for final certification. The same sampling strategy will be applied to both types of areas. Figure 1 illustrates the areas and boundaries for certification and re-certification. Certification and re-certification plans for these areas are being developed.

However, an acceptable underwater sampling protocol needs to be developed first. This letter presents the evaluation and selection of such a sampling protocol.

Given the unique sampling circumstances associated with collecting soil and sediment samples from a basin floor beneath water, U.S. Environmental Protection Agency (EPA) and Ohio Environmental Protection Agency (OEPA) guidance documents (References 1 through 3) were utilized to select the most appropriate sampling method to meet the sampling objective. The objective of the sampling will be to characterize both the sediment deposited in the basins via stormwater flow as well as the design-grade soil beneath the sediment by collecting 6-inch core samples. The analytical results will determine if the sediment and soil meet the soil final remediation levels for the area-specific constituents of concern.

The sampling objectives dictate the selection of the most appropriate sampling device and method from the reference EPA and OEPA literature based on two important requirements, 1) collection of a relatively undisturbed, continuous core sample consisting of both soft sediment and till material in order to determine the stratification (vertical profile) and, 2) proper depth control to observe the thickness of the sediment layer. To fulfill these requirements, the coring type device offers the essential advantages and necessary features and is consistent with both the referenced EPA and OEPA guidance documents. Many of the other types of sampling devices (e.g., clamshell, dredge or auger type) described in these documents are primarily designed for collecting unconsolidated surface sediments (<6 inches) rather than the vertical profile and deeper samples that are necessary for this sampling effort. Additionally, the dredge and grab-type devices can result in sample washout or loss, especially of fine-grained particles, and collects disturbed sample intervals with minimal depth control.

The standard method used for collection of subsurface soil cores for many years at the Fernald Closure Project can also be used for sampling of the soil/sediment beneath water, although the sampling will be performed manually from a boat. This method is consistent with the referenced EPA and OEPA guidance documents and the recommended tooling offers the advantage of collecting a relatively undisturbed, continuous 1 to 2-foot length core that will capture both the sediment (if present) and the till material representing the post-excavation elevation (design grade). The actual depth to which the core sampler is advanced (1 to 2-foot range) will be determined based on the findings at each sample location (i.e., elevation at top of sediment and possibly the visual observation of the initial core collected). The sampling team will ensure that the design grade till surface is penetrated 6 inches minimum. The continuous core will enable the field team to differentiate the sediment layer from the design-grade soil by observing the stratification of the core. The glacial till interval will also help to retain the core sample within the sampler during retrieval to the surface.

This methodology has been successfully used at the Fernald Closure Project in saturated boreholes (due to perched water) to collect cores comprised of both sand and clayey glacial till layers in a single core. The Macro-Core® sampling tool or an equivalent coring device will be used as described above (Figure 2). The coring device will be manually operated including driving the sampler to the 1 to 2-foot depth and removing the sampler using a slide hammer for both steps. A slight modification to the coring device will involve drilling a few holes in the upper steel body of the sampler to allow the water to be displaced while the core sampler device

advances into the sample media. Additional accessories including valves and sample retention baskets will be on hand and fitted to the coring device as necessary to ensure that representative samples are collected.

For the re-certification and certification samples to be collected, the till/sediment sample intervals at each boring location will be determined by the thickness of the sedimentation layer observed in the entire 1 to 2-foot continuous core. First, the top 6-inch interval from the entire continuous core will be collected as a sample. Secondly, if the sediment layer is found to be >3 inches within the top 6 inches, then the next 6 inches of till material will also be collected to ensure that the material at depth is not impacted by sediment deposition. If <3 inches of sediment is observed in the core, then only the top 6-inch interval sediment/till sample will be collected.

The amount of sediment deposition at the re-certification locations will be determined using a combination of two methods. First, the known elevation value obtained during the initial certification sample collection will be compared to the current sediment/till elevation (using global positioning system and accounting for water depth); the depth to the basin floor will be determined using a weighted line depth sounder. Secondly, visual observation of the 1 to 2-foot core sample will determine the sediment thickness by looking for the stratification between the sediment and the glacial till layer.

Due to the logistics of executing this sampling effort from a boat, it may be difficult to sample each location within a radius of 3 feet of the originally selected sampling location (as specified within each Project Specific Plan); therefore, this radius is being extended to 8 feet.

The described sampling strategy will be performed as a test demonstration in Area 4B-Part One to confirm that the methods can be implemented as described to achieve the collection of representative samples and determine the stratification of sediment versus the glacial till material present at the originally excavated grade. The underwater sampling in Area 4B-Part One involves re-certification of the area depicted in Figure 1. Improvements and adjustments to the method will be applied in the field as necessary. If the sampling method is successful, the collection method and justification will be incorporated into the Certification Design Letter (for submerged areas yet to be certified) or variance/field change notices to previous Certification Design Letters (for previously certified or certification-in-progress areas).

If you have any questions or require additional information, please contact me at (513) 648-3139.

Sincerely,

Johnny W. Reising
Director

Enclosures

Enclosures

cc w/enclosures:
J. Desormeau, OH/FCP
T. Schneider, OEPA-Dayton (three copies of enclosures)
G. Jablonowski, USEPA-V, SRF-5J
M. Cullerton, Tetra Tech
M. Shupe, HSI GeoTrans
S. Helmer, ODH
AR Coordinator, Fluor Fernald, Inc./MS6

cc w/o enclosures:
J. Chiou, Fluor Fernald, Inc./MS88
F. Johnston, Fluor Fernald, Inc./MS12
C. Murphy, Fluor Fernald, Inc./MS1

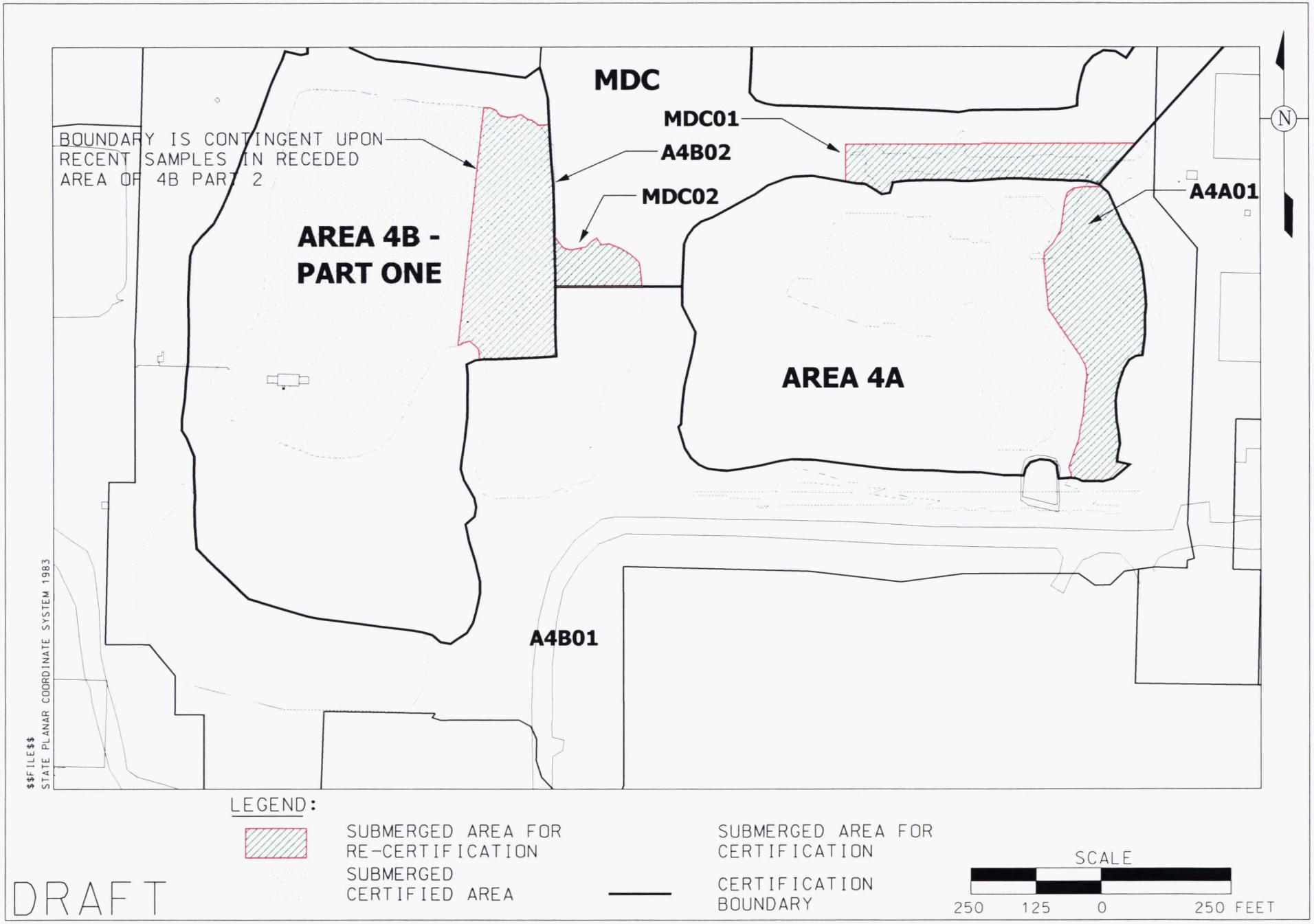

FIGURE 1. AREA 4 AND AREA 6 FORMER PRODUCTION AREA/MAIN DRAINAGE CORRIDOR SUBMERGED CERTIFICATION AND RE-CERTIFICATION AREAS

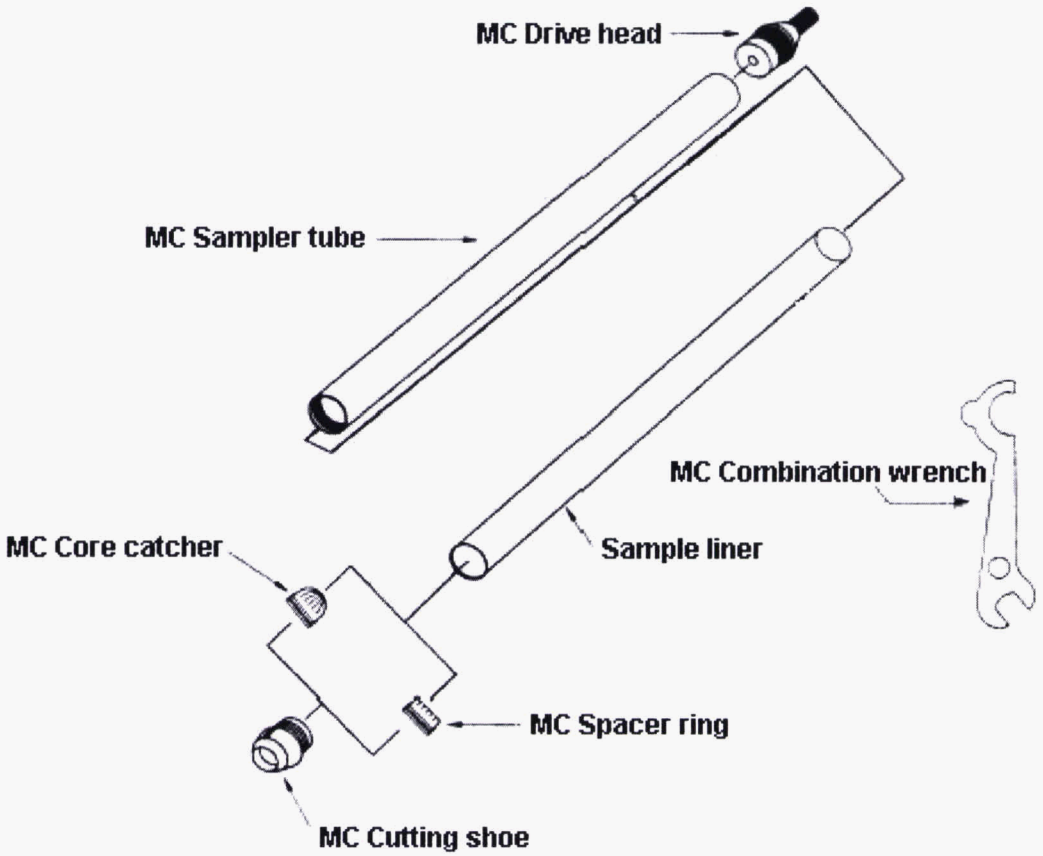

Figure 2: Macro-Core Sampling Device