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Mr. James A. Saric, Remedial Project Manager
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Region V, SR-6J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

DOE-0385-04

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

**USE OF HAND-HELD SODIUM IODIDE DETECTOR FOR PRELIMINARY SCAN OF
CONTAMINATED SOIL**

The purpose of this letter is to inform the United States Environmental Protection Agency (USEPA) and Ohio Environmental Protection Agency (OEPA) that the Real Time Instrumentation Measurements Program (RTIMP) at the Fernald Closure Project (FCP) has placed a new sodium iodide (NaI) tool into limited service. This new tool will be limited to use in highly contaminated areas for preliminary identification of soil above the On-Site Disposal Facility (OSDF) Waste Acceptance Criteria (WAC) for uranium followed by confirmation with our existing high-purity germanium (HPGe) detector systems. Thus, final excavation and disposal decisions for soil that exceeds the WAC trigger level for NaI detector systems will be based on HPGe confirmation as has been the case since the inception of the real-time gamma spectroscopy program at the FCP.

When scanning potentially highly contaminated soil there is a concern that the wheels and other components of the RTIMP NaI scanning vehicles may become highly contaminated. When exiting from highly contaminated areas, the decontamination process can be difficult and time consuming. To avoid frequent repetition of a potentially lengthy decontamination process, a hand-held 4-inch by 4-inch sodium iodide detector has been calibrated for use during initial scans of potentially highly contaminated areas. This detector can be covered with thin plastic wrap to prevent it from becoming contaminated and thus making it easier to release it from a contaminated area. This letter also describes how the hand-held instrument will be used.

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Detector Calibration

The hand-held 4x4 NaI detector was calibrated on the RTIMP calibration pad in the same manner that all RTIMP NaI detectors are calibrated. During the calibration process, the *a priori* Minimum Detectable Concentrations (MDC) for total uranium, radium-226 and thorium-232 and the total uranium WAC trigger level attainable in a four-second count were also derived. These values are listed in the table below:

4" x 4" Hand-Held NaI Detector Parameters		
Isotope	MDC (4 sec. count)	WAC Trigger (4 sec. count)
Total Uranium (ppm dry)	326	728
Radium-226 (pCi/g dry)	24.1	n/a
Thorium-232 (pCi/g dry)	2.3	n/a

The data above have been corrected for soil moisture content and the lab-field radon correction has been applied to the radium-226 MDC. As expected, because of their smaller volume, the corresponding four-second MDCs for the hand-held 4x4 detector are higher and the WAC trigger level is lower than the corresponding values for the typical 4x4x16 NaI detectors.

Mode of Operation

The hand-held NaI detector can be used on any horizontal, sloped or vertical surface where any of the other RTIMP NaI detectors, including the EMS, would normally be deployed, assuming safe access can be accomplished. The hand-held detector has the virtue that it can be rapidly deployed, with little risk of becoming contaminated, to help decide if an area is too grossly contaminated to risk using the other RTIMP NaI detectors. Except as noted below, the hand-held 4x4 NaI detector will be operated in the same manner as the other RTIMP NaI detectors. Instead of being mounted to a vehicle, it will be carried by an analyst, with the detector suspended 31 cm above the ground. Four-second spectra will be collected as the analyst walks back and forth across the contaminated area at a speed of one mile per hour, as will other manual-push NaI systems. Position coordinates for each spectrum will either be determined from a Global Positioning System backpack unit or estimated by computing positions based on travel speed and time from a known starting point. To reduce the possibility of missing highly contaminated hot spots, the separation distance between adjacent traverses will be ten feet, rather than the normal 15-foot separation. Radionuclide concentrations will be computed from raw spectra with the same software used to process all the other NaI data, although the 4x4 NaI data may not be processed in real time.

Two important points need to be made. First of all, since the purpose of the 4x4 NaI measurements is to perform a "pre-scan" that will enable the RTIMP to avoid severely contaminating their 4x4x16 NaI detectors and/or vehicles, the lower sensitivity (i.e., higher MDCs and lower trigger level) of the 4x4 detector is inconsequential. The data in the table

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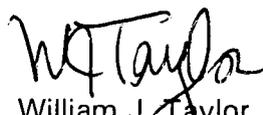
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demonstrate that the 4x4 detector has adequate sensitivity to detect elevated areas of contamination. Secondly, after a hand-held pre-scan has detected above-WAC conditions (exceedance of the 728 ppm total uranium trigger), the results have been confirmed with an HPGe detector, and the most highly contaminated soils have been removed, a normal NaI detector scan with one of the 4x4x16 detectors will be performed as though no prior scanning had been done.

While the pre-scan helps to avoid contaminating RTIMP detectors, the "official" scan will, as usual, be conducted with one of the 4x4x16 NaI mobile scanning systems which will generate the customary data set that all stakeholders are used to seeing. Once the RTIMP is reasonably certain that all highly contaminated soils have been removed, they will follow their normal routine of scanning all accessible areas with one of the mobile NaI platforms, followed by the usual HPGe confirmatory measurements when necessary. Follow-up actions to be performed in the event that the 4x4 NaI pre-scan reveals the presence of unusually high thorium-232 or radium-226 contamination will be decided on a case-by-case basis, bearing in mind that one purpose of the follow-up actions is to prevent contamination of the RTIMP 4x4x16 NaI detectors and vehicles.

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

Sincerely,


William J. Taylor
Director

FCP:Reising

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