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Nuclear Emergency Response: Comparison of Different Methodologies to Measure γ-Radiation from Ground Deposition

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The federal radiation assessment field team, led by Health Canada (HC), can be deployed in the event of a domestic nuclear emergency to measure radioactive contamination in areas where the public could be impacted. Several techniques are used to evaluate ground contamination levels including in-situ gamma spectrometry, soil sampling and field/aerial surveys. A better understanding of the inter-comparability of these methods can be obtained through measurements at a contaminated site. A known and previously characterized contaminated site at Canadian Nuclear Laboratories (CNL) in Chalk River was used to compare different emergency response techniques. A ground contamination survey using RaDCAMS (Radiation Data Collection and Mapping System), developed by HC, was performed to confirm the known distribution of radiation in the field. This survey was supported by an aerial survey performed by Natural Resources Canada. In-situ gamma spectrometry was performed by HC and Department of National Defence using HPGe detectors. Soil samples were collected in a cross pattern geometry centered at the location of the in-situ measurements. Samples were also collected in a square pattern geometry at the same location and were prepared and measured in-field using HC's Mobile Nuclear Laboratory (MNL). Soil samples from the cross pattern were measured in the MNL and compared to measurements performed by CNL and HC's National Monitoring Section (fixed laboratories). Results of an inter-comparison analysis, performed to identify areas of improvement and limitations in the detection and analysis of soil samples, will be presented. In addition, comparisons between in-situ measurements and soil samples will be shown. Finally, lessons learned that will be used to adapt methodologies in the event of a real nuclear emergency will be discussed.

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