COLD REGIONS EFFECTS ON TDEMI SURVEYS FOR METALLIC DEBRIS REMEDIATION CONFIRMATION

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Detection of buried munitions and metallic debris are common problems at historic firing ranges and war time sites throughout the world. The currently accepted approaches for munitions detection most commonly involve the use of time-domain electromagnetic induction surveying. Existing standards for this type of investigation dictate survey design parameters such as data density and interline spacing, while regulatory agencies often provide site specific TDEMI response clean-up standards. Typically, a TDEMI survey will be performed prior to remediation and post remediation to confirm the success of the removal efforts to responses below the clean-up standards or identify further areas of investigation. However, little attention is paid to the cold region conditions and complicating effects of snow on overall survey performance. Recent investigations at a munitions disposal site at Ft. Wainwright, Alaska provided a unique opportunity to study the effects of snow depth on the TDEMI response and subsequent detection accuracy. The height of the instrument above the target controls the overall received response decay at a rate of 1/r6, where r is the distance between the sensor coils and the target. Given the expected depth of penetration associated with the TDEMI instrumentation, a change in snow depth pack of only 0.10 meters or greater can cause a significant enough change in response to effectively miss a target resulting in false negative determinations. By examining the TDEMI results obtained at the site in conjunction with measured data, synthetic data and TDEMI models, we present an approach to account for the snow depth, and varying snow depths around a single target. Accounting for the deep snow effects through calibrated models allows us to better ensure the intended survey performance for site clean-up standards.