**SPRING VALLEY: advanced geophysical classification projects at urban wilderness and residential sites**

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Spring Valley Formerly Used Defense Site (SVFUDS) is a residential and wooded site in northwest Washington D.C and is comprised of the former Camp Leach and the American University Experiment Station (AUES). During World War I, former Camp Leach was used for staging, training, and billeting of troops. The AUES was established to investigate the testing, production, and effects of noxious gases, antidotes, and protective masks. The federal/city lots (public property) at SVFUDS are moderately dense forest with varying degrees of terrain slope. The anticipated target population at SVFUDS included 3-inch and 4-inch Stokes mortars, Livens projectiles, 75 millimeters and range as small as an MkIV booster. A second site (Site #2) is a suburban residential area and consists of single-family, detached dwellings. Beginning in the early 1900’s, Site #2 was used as a live fire artillery impact area for 75-millimeter projectiles (shrapnel and high explosive [HE]). A third site, (Site #3) is a rural area consisting of federal, state, and privately-owned properties generally used for residential, farming, and ranching purposes. During World War II (WWII), Site #3 was utilized as an infantry basic training camp. Infantry were trained in live fire exercises and historic records indicate previous landmine training.

To achieve the project-specific objectives, WESTON Solutions, Inc. (WESTON) utilized multiple advanced electromagnetic induction (EMI) sensors to perform advanced geophysical classification (AGC) surveys across 140 residential properties and federal/state/city lots. The implementation of AGC methods allowed for reduction in excavation which decreased project costs related to restoration of properties and shortened the length of schedule, minimizing inconveniences to homeowners. While these factors made AGC ideal compared to traditional methods, other challenges were presented when implementing AGC in urban wilderness and residential properties.

Challenges with data collection at all three sites occurred due to restrictions based on landscaping, terrain, and vegetative cover. These obstacles lead to the modification of survey techniques and survey equipment to accommodate the individual restrictions presented on a per-property basis. Inertial Measurement Units (IMU) used on AGC technologies show high sensitivity to environmental factors presented in these urban and residential sites. Additional data analysis was needed to mitigate investigation of non-targets of interest due to ambient site noise and saturated response areas associated with cultural features such as utilities, structures such as buildings, pools, and patios. A process was designed to further distinguish cannot analyze targets located within hardscape features.

While presented with challenges, AGC methods used in urban and residential areas were deemed effective. A total of 94,954 anomalies were detected above the property specific threshold from the dynamic surveys before the Informed Source Selection, when applicable, process which reduced the target list to a total of 35,529 locations selected for cued investigation. An additional 1,823 target locations just below the threshold were added back to the target list for cued investigation as part of the verification process, totaling 37,082 unique cued locations. Of the 37,082 unique cued locations, only 3,998 locations were selected and intrusively investigated. The use of AGC methods allowed reduction in digs of greater 95 percent (%). Evaluation of advanced EMI data collected using other AGC sensors in a residential setting will be discussed for comparison purposes. This multi-case history encompasses the issues encountered and results from data collection through production of final dig lists.