

QUADRAT SAMPLING OF SPLASHING INCIDENT EVIDENCE FOR URINE IDENTIFICATION USING RSID™-URINE

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We describe an evidence sampling method devised for identifying urine on dark-colored fabrics based on the classic ecological technique of quadrat sampling. Upon award of a contract for forensic body fluid identification on 400+ correctional officer uniforms annually, an approach was required for urine identification in alleged “splashing” incidents. Urine applied to sample agency uniform shirts and pants, primarily midnight navy and/or black and of various fabric compositions, was not visible under ambient light and did not produce observable fluorescence using any alternative light sources tested. Therefore, an alternative sampling method was required and devised for urine identification testing on evidence items with no observable staining. Both water and a mild detergent were evaluated as wetting solutions for swabbing large areas of fabric evidence. For either collection solution, wetting the substrate with the fluid followed by dry swabbing produced stronger signal on RSID™-Urine than swabbing dry fabric with a wetted swab. Fabric cuttings were demonstrated to produce more frequent and stronger positive results from control stains on a variety of fabric types than any swabbing technique; however, the size of each cutting was limited to 150 mm² for the desired extraction volume of 200 µL. A final, “quadrat-based” procedure reminiscent of strategies used in ecological surveying was adopted: (i) based on the event description, a region of interest (ROI) is identified; (ii) within every 150 cm² area, two 150 mm² cuttings are taken at random, thus directly sampling ~2% of the ROI; (iii) the remaining 98% of the ROI is sampled by wetting the fabric with a 1% Triton-X solution and swabbing up to three 150 cm² areas per swab; (iv) a cutting and swab of fabric outside the ROI are taken as substrate controls from each item. Method validation demonstrated that quadrat-based sampling could produce RSID™-Urine positive results from uniforms splashed with human urine without visible or fluorescent stains. Casework urine testing has to date produced positive results from 13.5% of items with visible staining and 9.4% of cases tested using quadrat-based sampling of unstained items.