OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need: Sample size limit for visual soil color determination (updated)

Keyword(s): Soil color, Munsell

Submitting subcommittee(s): Trace Materials **Date Approved:** 02/24/2021

(If SAC review identifies additional subcommittees, add them to the box above.)

Background Information:

1. Does this research need address a gap(s) in a current or planned standard? (ex.: Field identification system for on scene opioid detection and confirmation)

This research need directly addresses a gap in the draft "WK7003- Standard Practice for Determination and Comparison of Color by Visual Observation in Forensic Soil Examination."

2. Are you aware of any ongoing research that may address this research need that has not yet been published (e.g., research presented in conference proceedings, studies that you or a colleague have participated in but have yet to be published)?

There are no known studies addressing the lower size limit for visual soil color determination, except for a small assessment by instrumental colorimetry in Dong et al.

3. Key bibliographic references relating to this research need: (ex.: Toll, L., Standifer, K. M., Massotte, D., eds. (2019). Current Topics in Opioid Research. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-88963-180-3)

Draft ASTM Guide: WK70035 Standard Practice for Determination and Comparison of Color by Visual Observation in Forensic Soil Examination

Janssen DW, Ruhf WA, Prichard WW. The use of clay for soil color comparisons. Journal of Forensic Science. 1983 Jul 1; 28(3):773-6.

Sugita, R and Y. Marumo, 1996, Validity of color examination for forensic soil identification. Forensic Science International 83:201-210

Rabenhorst M, Thompson JA, Schmehling A, Rossi AM. Reliability of Soil Color Standards. Soil Science Society of America Journal 2015 Jan; 79(1):193-199. doi:10.2136/sssaj2014.10.0401.

Dong, C. E., Webb, J. B., Bottrell, M. C., Saginor, I., Lee, B. D., & Stern, L. A. (2020). Strengths, limitations, and recommendations for instrumental color measurement in forensic soil characterization. Journal of forensic sciences, 65(2), 438-449.https://doi.org/10.1111/1556-4029.14193

Post, D. F., R.B. Bryant, A.K. Batchily, A.R. Huete, S.J. Levine, M.D. Mays, R. Escadafal 1993. Correlations Between Field and Laboratory Measurements of Soil Color. In: J. M. Bigham, E. J. Ciolkosz, editors, Soil Color, SSSA Spec. Publ. 31. SSSA, Madison, WI. p. 35-49. doi:10.2136/sssaspecpub31.c3

Thompson, J. A., A. R. Pollio, and P. J. Turk. 2013. Comparison of Munsell Soil Color Charts and the GLOBE Soil Color Book. Soil Sci. Soc. Am. J. 77:2089-2093. doi:10.2136/sssaj2013.03.0117n

Rabenhorst, M.C., M.M. Matovich, A.M. Rossi, and D. E. Fenstermacher. 2014. Visual Assessment and Interpolation of Low Chroma Soil Colors. Soil Sci. Soc. Am. J. 78:567-570. doi:10.2136/sssaj2013.08.0347

Sánchez-Marañón, M., Huertas, R. and Melgosa, M., 2005. Colour variation in standard soil-colour charts. Soil Research, 43(7), pp.827-837. https://doi.org/10.1071/SR04169

Bigham, J. M., and Ciolkosz, E. J., editors, Soil Color, Soil Science Society of America Special Publication 31. Soil Science Society of America, Madison, WI, 1993, p 159.

Dudley, R.J., 1975. "The use of colour in the discrimination between soils," Journal of the Forensic Science Society, Vol 15, No. 3, pp. 209-218.

Kirillova, N. P., Grauer-Gray, J., Hartemink, A. E., Sileova, T. M., Artemyeva, Z. S. and Burova, E. K., "New perspectives to use Munsell color charts with electronic devices," Computers and Electronics in Agriculture, Vol 155, 2018, pp. 378-385.

Marqués-Mateu Á., Moreno-Ramón H., Balasch S., and Ibáñez-Asensio S., "Quantifying the uncertainty of soil colour measurements with Munsell charts using a modified attribute agreement analysis," Catena, Vol 1, 2018, pp. 171:44-53.

Shields, J. A., St. Arnaud, R. J., Paul, E. A. and Clayton, J. S., "Measurement of soil color," Canadian Journal of Soil Science, Vol 46, No. 1,1966, pp.83-90.

Cooper, T. H., "Development of students' abilities to match soil color to Munsell color chips," Journal of Agronomic Education, Vol 19, No. 2, 1990:141–144.

4. Review the annual operational/research needs published by the National Institute of Justice (NIJ) at https://nij.ojp.gov/topics/articles/forensic-science-research-and-development-technology-working-group-operational#latest? Is your research need identified by NIJ?

This research supports "Quantitative methods to augment visual trace evidence screening and examinations ".

5. In what ways would the research results improve current laboratory capabilities?

Virtually all forensic laboratories performing soil examination use color in their examinations processes, and most, if not all, use visual color determination. A study addressing the size limitation of this method would strengthen existing processes.

6. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

A study documenting the size limits for accurate color determination would validate well-established methodologies in soil color determination for forensic sized samples.

7. In what ways would the research results improve services to the criminal justice system?

The results would bolster a widely accepted method.

8. Status assessment (I, II, III, or IV): III

	Major gap in current knowledge	Minor gap in current knowledge
No or limited current research is being conducted	I	III
Existing current research is being conducted	II	IV

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.