

# OSAC RESEARCH NEEDS ASSESSMENT FORM



**Title of research need:**

Surficial distribution of particles from point sources  
(updated)

**Keyword(s):**

Individualization of particles, point source locations, relative age of particles, urban crime scenes

**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 identified research need will directly affect the interpretation of soils and their components.

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)?

We are unaware of any *forensic* studies that address this issue. However, some types of particles have society impact so there may be environmental studies that can be applied to forensic problems (many of the references listed in 3 fall into this category).

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)

MacDonald et al (2011). Dendroanalysis of metal pollution from the Sydney Steel Plant in Sydney, Nova Scotia. *Dendrochronologia*, 29, 9-15.  
Millette et al. (2009). Distinguishing coal, coke and other black particles. *The Microscope*, 57, 51-57.  
Millette et al. (2012). Characterization of coal ash including fly ash particles. *The Microscope*, 60, 73-84.  
Nirei et al. (2011). Classification of man-made strata for assessment of geopollution. *Episodes*, 35, 333-336.  
Odabasi et al. (2016). Investigation of spatial and historical variations of air pollution around an industrial region using trace and macro elements in tree components. *Science of the Total Environment*, 550, 1010-1021.  
Palenik, S. J. (1979). The determination of geographical origin of dust samples. In W. C. McCrone, J. G. Delly & S. J. Palenik (Eds.), *The Particle Atlas, Edition Two* (Vol. 5, pp. 1347-1361). Ann Arbor, MI: Ann Arbor Science Publishers.  
Perone et al. (2018). Oak tree-rings record spatial-temporal pollution trends from different sources in Terni (Central Italy). *Environmental Pollution*, 233, 278-289.  
Suzuki et al. (2009). Existence state of bromine as an indicator of the source of brominated flame retardants in indoor dust. *Environmental Science and Technology*. 43, 1437-1442.

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 addresses: “Quantitative methods to augment visual trace evidence screening and examinations”; “Scientific foundations for expert conclusions of forensic evidence.”

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

Particles commonly encountered in dust and soil analyses that are not further investigated (ash, glass spheres, rubber), if better understood in terms of their origin, characteristics and distribution, could assume greater forensic significance.

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

1. A component of geological trace evidence analysis will be added to the array of materials that can be analyzed in soils and dusts, improving the quality of the interpretation.
2. Geological methods can be better applied to the high-volume and challenging urban environments.

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

In cases in which point source particulates occur as evidence, the new research will provide insights into the most relevant analyses to conduct and improve the interpretation of their significance in criminal investigations.

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

I

	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.*