

Air Toxics Science Advisory Committee

Elemental Carbon: Some Details

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ATSAC Meeting #7, DEQ HQ

EC as surrogate for diesel exhaust

Many technical papers and agency reports support the use of EC as a surrogate measure of DE.

- Vermeulen et al., 2010
- Noll et al., circa 2006
- Schauer, 2003
- OEHAA, 1998...?
- Birch and Cary, 1996

NIOSH Method 5040: “Elemental Carbon (Diesel Particulates)”

Elemental Carbon vs. Black Carbon

EC is commonly referred to (incorrectly) as BC, or even Carbon black – and vice versa. Definitions appear fluid between authors and/or agencies.

EC = EC is refractory carbon measured by thermal/optical carbon analyzers in the lab. Product of combustion.

BC = measured optically via light absorption. Created by incomplete combustion of fossil fuels and biomass.

Carbon black = man-made product of nearly pure EC.

Analytical Considerations

Currently, DEQ extrapolates DPM concentrations from BC samples collected via filters in aethalometer.

EC typically analyzed via an ECOC method (e.g., IMPROVE ECOC, NIOSH ECOC, STN) and use of a temperature split-point to distinguish EC from OC.

Problem: EC analytical results vary from method to method and between different laboratories.

Some suggested protocols exist for extrapolating DPM from EC.

Questions:

Is an ABC for DPM sufficient?

Would EC be a good surrogate for DE / DPM?

Should ABCs be identified for both DPM and EC?