

Abstract LOI 22c
Alternative Method of Aerosol Sampling

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Currently the National Children’s Study uses a modified gravimetric method to measure airborne concentrations of particulate matter (PM 2.5 and smaller) over the course of a week inside homes of study participants. However, this method has some limitations in aerosol exposure estimation: (1) volatile organic compounds (VOC’s) and liquid droplets are underestimated due to volatilization and evaporation, and (2) gravimetric methods miss quantifying smaller and larger aerosols present—particles of increasing interest due to their associations with adverse health outcomes. The primary aim of this study is to validate a direct reading instrument (GRIMM 1.109) as an alternative to gravimetric sampling for the NCS. While comparing these two methods it was discovered that the protocol for the pump and filter method may be invalid and result in inaccurate data. As a result, an additional aim of this research is to validate a gravimetric method so we have an appropriate reference for which to compare a direct reading instrument. On this new aim, 16 samples were taken simultaneously in close proximity to each other. Eight samples were obtained using the original NCS protocol, and 8 were obtained using a further modified method informed by a manufacturer and good industrial hygiene practice. Results show that samples prepared according to the NCS protocol resulted in poor correlation ($R^2 = .085$) and gravimetric samples utilizing the modified method were well correlated ($R^2 = .831$). Using the modified gravimetric method as a reference, preliminary data indicate that the GRIMM 1.109 is an appropriate alternative to the pump and filter method for aerosol exposure estimation.



Fig. 1: Grimm 1.109 compared with NCS sampler



Fig. 2: Grimm 1.109 and modified sampler

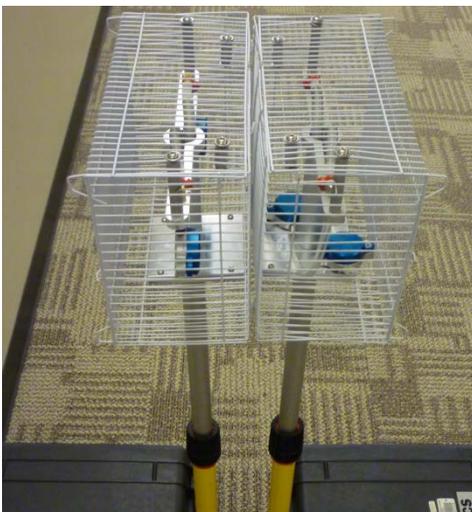


Fig. 3: Close proximity comparison test



Fig. 4: NCS air sampler modified to allow PEM’s to be placed in a horizontal position, reducing the possibility of oil migration.