

COMPARISON OF COLLOCATED DICHOTOMOUS AIR SAMPLERS AND A PM_{2.5} FRM AIR SAMPLER

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The Hillsborough County Environmental Protection Commission in Tampa, Florida, recently deployed two Rupprecht & Patashnick Model 2025 Dichotomous Sequential Air Samplers and a manual PM_{2.5} Federal Reference Method air sampler at a coastal site on Tampa Bay. These instruments were operated concurrently for ~30 days to determine the bias and precision of fine (PM_{2.5}) and coarse (PM_{coarse}: PM₁₀-PM_{2.5}) particulate matter measurements among these samplers. The 24-hour integrated PM_{2.5} and PM_{coarse} ambient air samples were collected at a total flow rate of 16.7 L/min. A split flow channeled 15.0 L/min and 1.67 L/min of the ambient air onto PM_{2.5} and PM_{coarse} 47-mm diameter PTFE filters, respectively. The EPA-certified Florida Department of Environmental Protection (DEP) Laboratory in Tallahassee did the gravimetric analyses of the filters. Between the two dichotomous air samplers, the average concentration, relative bias and relative standard deviation were 9.9 µg/m³, 2.6% and 3.2% for PM_{2.5} concentrations, and 12.0 µg/m³, 6.9% and 7.7% for PM_{coarse} concentrations. Paired *t*-tests using a Student's *t*-distribution indicated that between these samplers both the PM_{2.5} and PM_{coarse} concentrations were significantly different at the 95% confidence level. Between a dichotomous and a PM_{2.5} FRM air sampler, the average concentration, relative bias and relative standard deviation were 12.0 µg/m³, 1.3% and 3.1%, and bias was not significant at the 95% confidence level. These results confirm that the dichotomous sequential air sampler can meet a 10% relative bias and 10% relative precision target for ambient air particulate measurements, and reveal the potential for the dichotomous air sampler to combine FRM PM_{2.5} and PM₁₀ measurements in one sampler. This project is part of an air toxics deposition study funded by USEPA and DEP and directed by the Tampa Bay Estuary Program.