

Testing of Cerex Open-Path Ultraviolet Differential Optical Absorption Spectroscopy Systems for Fenceline Monitoring Applications

Eben D. Thoma,¹ Edgar Thompason,¹ Jason DeWees,² Parik Deshmukh,³ Tom Wisniewski,⁴ Scott McEwan,⁴ Dennis Sosna,⁵ Hallie Weiss,⁵ Carol Ann Gross-Davis,⁶ Howard Schmidt,⁶
¹U.S. EPA, ORD, RTP, NC, ²U.S. EPA, OAR, RTP, NC, ³Jacobs Engineering Inc., RTP, NC,
⁴Cerex Monitoring Solutions LLC, Atlanta, GA, ⁵Philadelphia AMS, Philadelphia, PA,
⁶U.S. EPA, Region 3, Philadelphia, PA

Principal Contact: U.S. EPA, Research Scientist, U.S. EPA, Office of Research and Development, National Risk Management Research Laboratory, 109 TW Alexander Drive, E343-02, Research Triangle Park, NC, Phone: 919-541-7969, Fax: 919-541-0350, E-mail: thoma.eben@epa.gov

Abstract

Development of cost-effective, time-resolved fenceline measurement methods that facilitate improved emissions mitigation strategies is of growing interest to both industry and regulators. Ground-based optical remote sensing (ORS) is a well-known class of technical approaches used in fenceline monitoring applications and to quantify emissions from fugitive and area sources. ORS systems employ open-path optical beams to spectroscopically speciate and quantify path-averaged pollutant concentrations in an advected plume. The long optical paths used help capture spatially variable emissions from the nearby sources. When coupled with wind transport and/or micrometeorological analysis, ORS approaches can be used to locate sources and provide estimates of emission rates. Open-path ultraviolet differential optical absorption spectroscopy (UV-DOAS) systems are particularly useful for detection and speciation of benzene and related aromatic compounds. Although UV-DOAS is well-published in the literature and has been commercially available for over a decade, significant method development questions remain regarding expected performance characteristics and standardized analysis approaches. In recent years, significant advances in sensor performance and analytical approaches have improved both minimum detection capability and analysis automation. This presentation will review recent collaborative work in controlled testing and field deployment with one commercially available open-path UV DOAS system made by Cerex monitoring solutions. The discussion will focus on progress towards defining performance-based (non-vendor specific) methods for fenceline measurements of the compound benzene.