

Emissions from Three Oil and Gas Facilities Off the Gulf Coast of Mexico

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The Aerodyne Research, Inc. Mobile laboratory was deployed to three oil and gas production facilities in Poza Rica (Veracruz, Mexico). An extensive number of analytes were measured including methane, ethane, SO₂, CO, CO₂, aerosols of different sizes and many volatile organic hydrocarbons (VOCs). Cooperation with industry led to on-site access to these facilities, enabling the use of tracer-release as a method for quantifying emission sources.

Tracer-release relies on the deliberate release of one or several tracer molecules (acetylene or N₂O in this case) at known flow rates from known locations. Downwind measurements then intercept their overlapping plumes of tracer and analyte. The ratios of their concentrations are directly related to the ratios of their flows, allowing for the determination of emission rates.

In addition to tracer-release studies, the interplay between measured analytes allows for some degree of characterization of the source fuels and site processes. Inefficient combustion is distinguishable from direct leaks, whereas sulfur content, ethane to methane ratios, and observed VOCs can be used to differentiate oil and gas from different geological sources and at different stages of refinement.

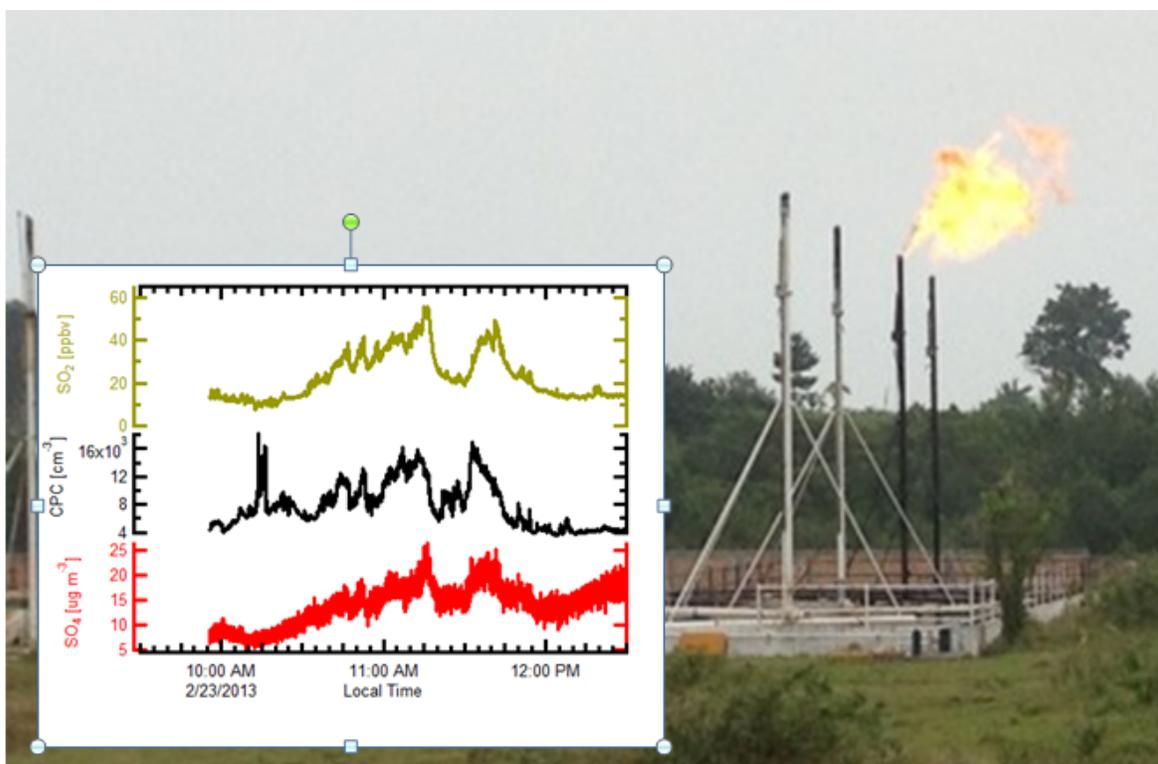


Figure 1. Lit and Unlit Flares at a Poza Rica Oil and Gas facility. Inset graph shows time traces for SO₂ (quantum cascade laser system), SO₄ (aerosol mass spectrometer) and total number of particles (condensation particle counter).