



Advanced Monitoring GMAP – Field Monitoring NEIC’s Field Support Capabilities

Key Applications:

- Area emission source assessments and identification
- Facility emission source assessments

Capabilities:

- BTEX at ppb levels
- SO₂ at ppb levels
- CH₄ at ppm levels
- H₂S at ppb to ppm levels
- Total VOCs at ppb levels
- Meteorological data
- Location information
- Software integration

Highlighted Results:

- Identified the specific source of hundreds of odor complaints, which allowed Region 7 to negotiate a decrease in emissions that also dramatically reduced complaints
- Surveyed more than 200 facilities for emission sources in six days, which allowed the Colorado Department of Public Health and the Environment to issue 65 immediate findings in eastern Colorado
- Located a benzene emission source, which led to a \$2.5 million settlement payment to the state of Texas

Instrumentation:

- Cavity ring-down spectrometer for methane and hydrogen sulfide
- Differential ultraviolet absorption spectrometer (DUVAS) for BTEX and SO₂
- Photo-ionization detector (PID) for total VOCs
- Global positioning system
- Weather station for wind speed and direction, temperature, and pressure

Key Personnel:

- Bill Squier – project manager

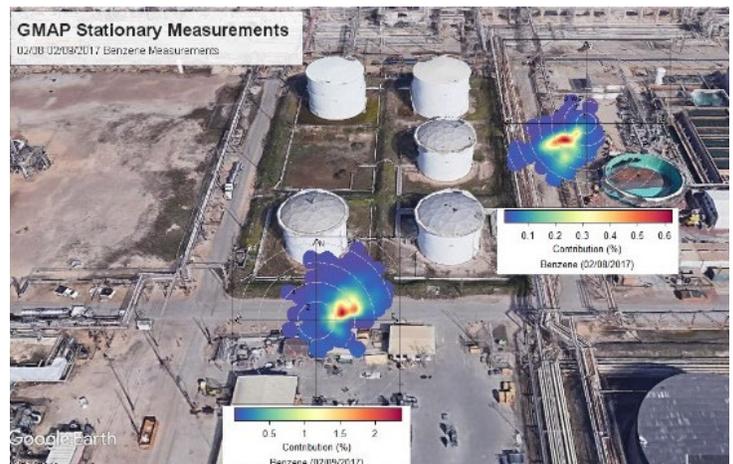
Geospatial Measurement of Air Pollution (GMAP)

The National Enforcement Investigations Center (NEIC) has a mobile air monitoring vehicle, or GMAP, that is equipped with analyzers for methane (CH₄); benzene, toluene, ethylbenzene, and xylene (BTEX); hydrogen sulfide (H₂S); total volatile organic compounds (VOCs); and meteorological and global positioning system (GPS) equipment. This combination of equipment allows for real-time monitoring and mapping of pollutants while the vehicle is in motion or stationary. The mobile platform can evaluate large geographic areas in very short timeframes to identify emission sources. GMAP can also be used to take stationary measurements at facilities.



The adjacent figure provides an example of GMAP results from mobile monitoring for hydrocarbons. These results present the wind direction and speed that are used to identify the location of the emission source, as well as the relative concentration (represented from low to high by green to red) of the emissions at each geo-spatially identified location.

NEIC can use the GMAP data collected from stationary monitoring to generate polar plots. An example is overlaid on the adjacent figure. Polar plots illustrate both the direction to the source and the relative concentration of emissions. NEIC inspectors analyze the polar plots to isolate and attribute emissions to specific facilities.



NEIC's investigation support with GMAP: Since 2012, GMAP has been used across the country providing support to EPA's regions and headquarters, other federal agencies, and the states. NEIC has conducted mobile area emission source assessment surveys with GMAP at large industrialized areas to assess potential emissions and determine their sources. GMAP has also been used for facility emission source assessments for various industries including refineries, chemical plants, energy extraction wells, and landfills.

Select GMAP investigation results:

- In 2016 in Region 7, GMAP identified elevated levels of methane at a landfill. Region 7 used the data to negotiate with the facility to lower emissions, resulting in a reduction of odor complaints from more than 300 in October 2015 to less than 50 in December 2016.
- In 2016, NEIC partnered with the Colorado Department of Public Health and Environment (CDPHE) and conducted GMAP surveys at more than 200 facilities in six days in eastern Colorado. The CDPHE staff used NEIC's interpretation of GMAP's real-time monitoring data, in conjunction with infrared camera surveys, to issue 65 immediate findings.
- In 2017, NEIC support was requested to provide additional data on a leaking tank at a tank terminal in Texas to support stalled settlement talks. GMAP identified high-level benzene emissions, which compelled the facility to settle and resulted in payments of a \$2.5 million civil penalty and \$40,000 in attorney fees to the state of Texas. The settlement also provided injunctive relief that included the installation of a flare, implementation of an advanced tank inspection program, and requirements for third-party audits.

GMAP method validation: GMAP currently provides relative concentration data that are confirmed by laboratory analysis. However, NEIC is developing test methods so GMAP can provide validated data with known detection limits in the future.

How GMAP can support your investigation:

- BTEX, SO₂, CH₄, H₂S, total VOCs and other compounds that are under development
- Real-time results
- Mobile and stationary monitoring
- Ability to monitor wide areas or multiple facilities quickly
- Identify new or screen existing inspection targets
- Identify unknown sources
- Estimate mass emission rates
- Low detection limits

How to obtain NEIC's support

To request a deployment of GMAP, or if you would like to learn more about GMAP or NEIC's other advanced monitoring capabilities, please contact us at neic_project_requests@epa.gov.