



# GMAP Targeting Criteria

## Bureau of Air Management

### Background

Geospatial Measurement of Air Pollution (GMAP) is the use of fast-response instruments and precise Global Positioning System data in mobile vehicles to spatiotemporally-resolve air pollution patterns in a variety of use scenarios. The Department of Energy and Environmental Protection (DEEP) has procured a mobile vehicle which will allow staff to utilize GMAP technology to investigate numerous air quality questions and concerns.

Using the GMAP vehicle, staff will have the ability to investigate emissions of 16 different air pollutants (see Table 1). The GMAP vehicle is equipped with a weather station that can measure wind speed and direction, air temperature, wind chill, relative humidity, and barometric pressure. Additionally, the GMAP vehicle features an aethalometer, which will discriminate between black carbon from fossil fuel combustion versus biomass combustion, as well as a photoionization detector that can measure the concentration of total volatile organic compounds, as isobutylene, and a Summa canister sampling system. The GMAP vehicle is equipped with three source assessment modes:

1. Concentration Mapping – involves measuring and recording concentrations of target compounds along a specific route. May reveal unknown sources and source contributions.
2. Source Characterization – improves understanding of the location, variability, and composition of known or discovered emission sources. May assist staff in focusing enforcement activities.
3. Emission Quantification – measures/estimates source emission concentrations from a remote vantage point.

Use of the GMAP vehicle will provide the benefits of a “Next Generation Compliance” tool and further progress in DEEP’s commitment to protecting air quality and public health and promoting environmental justice.

### Goal

Using the GMAP vehicle, DEEP intends to identify sources of pollution that have gone undetected using traditional source identification techniques and investigate a variety of air quality questions and concerns. By allowing DEEP to better understand emissions and exposure at a hyperlocal level, the GMAP vehicle will fill the gap between the data obtained through DEEP’s regulatory monitoring network (consisting of 14 air monitoring stations that primarily measure criteria pollutant concentration) and emission testing of point sources.

### Targeting Criteria

Depending on the priorities of the Department, the Enforcement Division may target areas for GMAP vehicle surveillance based on many different criteria. The criteria presented in this section can be used as part of an initiative or to assign a priority level to target areas within an initiative. Naturally, enforcement priorities, initiatives, and staffing/resource availability will change over time.

Potential areas for GMAP vehicle surveillance will be informed based on data review from sources such as:

- **DEEP Environmental Justice Communities Map.** This map can be utilized to prioritize surveillance of environmental justice (EJ) communities in Connecticut, as defined by Connecticut State Statute 22a-20a. This map includes all distressed municipalities, as well as census block groups within other affected towns for which 30% of the population lives below 200% of the federal poverty level.
- **CT DPH Asthma Statistics.** The Connecticut Department of Public Health website presents a variety of statistics on asthma prevalence rates in Connecticut. Asthma hospitalization and emergency department visit rates can be compared across towns to prioritize surveillance areas. Information is drawn from the Connecticut Inpatient Hospitalization and Emergency Department Visit Dataset and Connecticut annual population estimates.
- **NATA.** EPA’s National Air Toxics Assessment provides broad estimates of the risk of developing cancer and other serious health effects over census tracts across the state. It includes estimates of exposure and risk for 180 air toxics and diesel particulate matter. The 2014 NATA Map Application (the most recent assessment available) can be used to view the following data within a census tract:
  - Population
  - Area
  - Total risk
  - Point risk
  - Nonpoint risk
  - On-road risk
  - Nonroad risk
  - Fire risk
  - Biogenic risk
  - Secondary risk
  - Background risk
- **EJSCREEN.** EPA’s environmental justice mapping and screening tool includes 11 environmental indicators, six demographic indicators, and 11 Environmental Justice (EJ) indexes. Each index combines demographic information with a single environmental indicator (such as proximity to traffic) and can help identify communities that may have a high combination of environmental burdens and vulnerable populations. Data can be viewed by county, city, census tract, census block group, or any other user-defined area. The 11 EJ index names are:
  1. National Scale Air Toxics Assessment Air Toxics Cancer Risk
  2. National Scale Air Toxics Assessment Respiratory Hazard Index
  3. National Scale Air Toxics Assessment Diesel PM (DPM)
  4. Particulate Matter (PM2.5)
  5. Ozone
  6. Lead Paint Indicator
  7. Traffic Proximity and Volume
  8. Proximity to Risk Management Plan Sites
  9. Proximity to Treatment Storage and Disposal Facilities
  10. Proximity to National Priorities List Sites
  11. Wastewater Discharge Indicator

EJSCREEN also allows the user to locate various places of interest on the map, including: sites reporting to EPA, hospitals, schools, EPA tribal areas, public housing, subsidized housing, and more.

- **DEEP Air Complaint Log.** Complaints submitted by the public can be sorted by town and date of complaint. Numerous complaints within the same area, in a specified time period, may warrant GMAP vehicle surveillance (especially if the source of the emissions is unknown).
- **Town Zoning Maps.** Zoning maps provide a wealth of information, including an excellent visual representation of each use area within a town. The user can quickly locate residential, educational, and light or heavy industrial

zones to determine where industry may have the greatest effect on a neighborhood. Zoning maps may also distinguish planned development districts, enterprise zones, or opportunity zones.

- **Google Maps.** Potential GMAP vehicle surveillance areas can be selected by investigating the number and type of air emission sources within a specified area in Google Maps. Examples of higher risk industries which may warrant surveillance are listed in Table 2.
- **Community Input.** Community and EJ area advisory boards may be employed to engage the public and obtain feedback from community representatives. The perspectives may be used to target areas for GMAP vehicle surveillance and thereby address issues raised by citizen/community groups and the public.
- **Power Plants and Neighboring Communities Mapping Tool.** This resource provides information about power plant emissions and the demographics of neighboring communities. It can be applied to understand the disproportionate impacts of air pollution from power plants on overburdened communities.
- **TRI.** The Toxics Release Inventory can provide information on the type and amount of chemicals being released in specified areas. This tool also allows the user to determine which facilities in a specified area release the largest amount of toxic chemicals. TRI Explorer can be used to target areas for GMAP vehicle surveillance by generating reports on releases, transfers, and waste managed that can be displayed by facility, chemical, geographic area, industry (NAICS code), and reporting year, and can be mapped.
- **ECHO.** The Enforcement and Compliance History Online website can be utilized to search for facilities in a community, assess source compliance with environmental regulations, create enforcement-related maps, analyze trends in compliance and enforcement data, and more.
- **EMIT.** Connecticut's web-based air emissions reporting application serves as a repository for valuable source emissions data and compliance reports, which can be used to assess emissions trends and inform planning.
- **CADIS.** The Compliance Analysis Database and Information System houses important facility information; reviews of Title V, NSPS, and NESHAP reports; and enforcement history and inspection data that can be used when targeting GMAP vehicle surveillance areas.
- **SIMS.** The Site Information Management System provides the ability to generate reports on permitting and enforcement statistics, compliance history, and active permits within a specified town. SIMS also allows the user to view a variety of information (address, contact information, application, and permit status, etc.) and documents (permits, enforcement actions, inspection reports, etc.) related to a specific source.
- **SEMATS.** The Source Emissions Monitoring Assignment Tracking System provides stack testing information (test dates, pollutants evaluated, test results, etc.).
- **BAMED.** The Bureau of Air Management Enforcement Database provides detailed information and reports on Notices of Violation and Orders issued to sources within Connecticut.

## Tables

**Table 1. Pollutants that can be measured using GMAP vehicle surveillance**

Benzene	Toluene	Ethyl benzene	m-, o-, p-Xylene
Nitrogen oxide	Nitrogen dioxide	Ozone	Sulfur dioxide
Black carbon	Formaldehyde	1,3-Butadiene	Ammonia
Particulate matter (PM <sub>2.5</sub> and PM <sub>10</sub> )	Styrene	Methane	Carbon dioxide

**Table 2. Examples of High-Risk Industries**

Category 1	Landfills, waste-to-energy plants (municipal waste combustors), biomass-fired power plants (biomass combustors), fuel storage tank farms, high truck traffic areas, sewage sludge incinerators, incinerators, chemical manufacturing facilities
Category 2	Hazardous waste treatment, storage, and disposal facilities; gasoline stations; power plants (oil and gas)
Category 3	Scrapyards, hospitals, asphalt plants, concrete batch plants

## Additional Background Information for Selected Databases

- DEEP Air Complaint Log.** The DEEP Air Complaint Log is housed in Assign and contains a record of all complaints filed by citizens via phone or email. The purpose of the log is to gather complaints submitted by the public and determine which situations may be worthy of investigation by a field engineer.
- ECHO.** The Enforcement and Compliance History Online website provides integrated compliance and enforcement information for more than one million regulated facilities nationwide. Its features range from simple to advanced, catering to users who want to conduct broad analyses as well as those who need to perform complex searches. Specifically, ECHO allows users to find and download information on:
  - Search for facilities
  - Find EPA enforcement cases
  - Analyze compliance and enforcement data
  - Access data services
  - Inform/communicate with EPA

(source: [ECHO Quick Start Guide](#) | [ECHO](#) | [US EPA](#)).

For additional information about ECHO, see: [Enforcement and Compliance History Online](#) | [US EPA](#).

- EJSCREEN.** EJSCREEN is an environmental justice mapping and screening tool that provides EPA with a nationally consistent dataset and approach for combining environmental and demographic indicators. EJSCREEN users choose a geographic area; the tool then provides demographic and environmental information for that area. All

of the EJSCREEN indicators are publicly available data. EJSCREEN simply provides a way to display this information and includes a method for combining environmental and demographic indicators into EJ indexes.

EJSCREEN includes:

- 11 environmental indicators
- 6 demographic indicators
- 11 EJ indexes

Each EJ index combines demographic indicators with a single environmental indicator. This tool provides a number of capabilities including:

- Color coded mapping
- The ability to generate a standard report for a selected area
- Comparisons showing how a selected area compares to the state, EPA region or the nation

EJSCREEN replaces EJView, a previous publicly available environmental justice screening tool, and incorporates recommendations from the National Environmental Justice Advisory Council (NEJAC).

Anyone using EJSCREEN should note there is substantial uncertainty in demographic and environmental data, particularly when looking at small geographic areas. EJSCREEN is not intended to provide a risk assessment. Also, EJSCREEN does not provide data on every environmental impact and demographic indicator that may be relevant to a particular location, and data may be several years old. Screening results should be supplemented with additional information and local knowledge to get a better understanding of the issues in a selected location (source: [What is EJSCREEN? | EJSCREEN: Environmental Justice Screening and Mapping Tool | US EPA](#)).

For additional information about EJSCREEN, see: [EJSCREEN: Environmental Justice Screening and Mapping Tool | US EPA](#).

- **EMIT.** The Emissions Inventory Reporting System is Connecticut's web-based air emissions reporting application. EMIT supports filing of air emission statements, as well as Title V and synthetic minor source air compliance reporting. Air emissions inventory information assists in planning to reduce emissions to meet federal and state mandates, tracking Connecticut's progress towards meeting air quality goals, and mitigating significant impacts of air pollution. Capabilities include the following report types: radius search, site emissions, emissions summary, site count, etc.

Emissions are identified with a source in terms of the type of pollutant and the quantity of emissions. Pollutants maintained in DEEP's air inventories include traditional or criteria pollutants (e.g., nitrogen oxides, volatile organic compounds, sulfur dioxides, particulate matter), toxic air pollutants (e.g., mercury, ammonia, benzene) and greenhouse gases (e.g., carbon dioxide, methane). Specialized methods have been developed to calculate individual pollutant emissions associated with each source category. The resulting information can be aggregated and sorted to assess emissions trends, ambient impact analysis and inform planning.

- **NATA.** The National Air Toxics Assessment (NATA) is EPA's ongoing review of air toxics in the United States. EPA developed NATA as a screening tool for state, local and tribal air agencies. NATA's results help these agencies identify which pollutants, emission sources and places they may wish to study further to better understand any possible risks to public health from air toxics.

NATA gives a snapshot of outdoor air quality with respect to emissions of air toxics. It suggests the long-term risks to human health if air toxics emissions are steady over time. NATA estimates the cancer risks (the probability that adverse health effects will occur from exposure to a hazard) from breathing air toxics over many years. It also estimates noncancer health effects for some pollutants, including diesel particulate matter (PM). NATA calculates these air toxics concentrations and risks at the census tract level. It only includes outdoor sources of pollutants.

Air quality specialists use NATA results to learn which air toxics and emission source types may raise health risks in certain places. They can then study these places in more detail, focusing where the risks to people may be highest (source: [NATA Overview | National Air Toxics Assessment | US EPA](#)).

#### Glossary of Selected NATA Terms

- **“N”-in-1 million cancer risk:** A risk level of “N”-in-1 million implies that up to “N” people out of one million equally exposed people would contract cancer if exposed continuously (24 hours per day) to the specific concentration over 70 years (an assumed lifetime). This would be in addition to cancer cases that would normally occur in one million unexposed people.
- **Atmospheric transformation (secondary formation):** The process by which chemicals are transformed into other chemicals in the air (atmosphere). When a chemical is transformed, the original pollutant no longer exists; it is replaced by one or more new chemicals. Compared to the original chemical, the transformed chemical can have more, less or the same toxicity. Transformations and removal processes affect both the fate of the chemical and how long it stays in the air, called its persistence. Persistence is important because human exposure to a chemical depends on the length of time the chemical remains in the air. In NATA, we use both “atmospheric transformation” and “secondary formation”; they mean the same thing.
- **Background concentrations:** The amount of a pollutant that exists in the air that does not come from a specific source. These pollutants may come from a natural source or from distance sources. Background concentrations can explain pollutant concentrations found even without recent human-caused emissions. In NATA, we add background concentrations to AERMOD concentrations but not to CMAQ concentrations, which include background already. Most risk from NATA background concentrations is from carbon tetrachloride, a common pollutant that has few emission sources but is persistent due to its long half-life.
- **Biogenic emissions:** Biogenic emissions are emissions from natural sources, such as plants and trees. These sources emit formaldehyde, acetaldehyde, and methanol; formaldehyde and acetaldehyde are key risk drivers in NATA. Biogenic sources also emit large amounts of other nonhazardous VOCs. We estimate biogenic emissions with a model that uses vegetation and land use data with temperature and solar radiation data. In addition to being a primary source of air toxics, compounds emitted by biogenic sources sometimes react with human-caused pollutants to form secondary pollutants. The NATA biogenics source group includes only the primary emissions.
- **Cancer risk:** The probability of contracting cancer over the course of a lifetime, assuming continuous exposure (assumed in NATA to be 70 years).
- **Census tracts:** Land areas defined by the U.S. Census Bureau. Tracts usually contain from 1,200 to 8,000 people, with most having close to 4,000 people. Census tracts are usually smaller than 2 square miles in cities, but are much larger in rural areas.
- **Lifetime cancer risk:** The probability of contracting cancer over the course of a lifetime (assumed to be 70 years for the purposes of NATA).
- **Noncancer risks:** Risks associated with health effects other than cancer.
- **Nonroad mobile sources:** Mobile sources not used on roads and highways for transportation of passengers or freight. Nonroad sources include:
  - aircraft;
  - heavy equipment;
  - locomotives;

- marine vessels;
- recreation vehicles (snowmobiles, all-terrain vehicles, etc.); and
- small engines and tools (lawnmowers, etc.).
- **On-road mobile sources:** Mobile sources used on roads and highways for transportation of passengers or freight. On-road sources include:
  - passenger cars and trucks
  - commercial trucks and buses; and
  - motorcycles.
- **Risk:** The probability that adverse effects to human health or the environment will occur due to a given hazard (such as exposure to a toxic chemical or mixture of toxic chemicals). We can measure or estimate some risks in numerical terms (for example, one chance in a hundred).
- **Secondary sources:** See "Atmospheric transformation (Secondary Formation)"

For additional information about NATA, see: [National Air Toxics Assessment | US EPA](#).

- **SIMS.** The Site Information Management System is a suite of integrated applications which provides the ability to holistically view sites and clients with associated environmental interests (application, permit, environment action, etc.), spatially locate sites and features, and review associated documents.
- **TRI.** The Toxics Release Inventory tracks the management of certain toxic chemicals that may pose a threat to human health and the environment. U.S. facilities in different industry sectors must report annually how much of each chemical is released to the environment and/or managed through recycling, energy recovery and treatment. (A "release" of a chemical means that it is emitted to the air or water, or placed in some type of land disposal.)

The information submitted by facilities is compiled in the Toxics Release Inventory. TRI helps support informed decision-making by companies, government agencies, non-governmental organizations, and the public (source: [What is the Toxics Release Inventory? | Toxics Release Inventory \(TRI\) Program | US EPA](#)).

For additional information about TRI, see: [Toxics Release Inventory \(TRI\) Program | US EPA](#).