Purpose

The function of the Air Toxics Analytical Support Team (ATAST) is to provide the Division of Air Quality with a focused and intensive investigative and monitoring resource for air pollution assessment.

ATAST typically conducts two types of air quality investigations:

- **Planned Investigations** are carefully designed studies to evaluate the concentrations of pollutants in a community or area.
- **Unplanned Investigations** require rapid responses to accidental chemical releases where air monitoring is performed to assess the amounts of released chemicals and their potential impacts on the community.

To accomplish and support these tasks, ATAST is equipped with two main response vehicles (an emergency air monitoring trailer and mobile air monitoring laboratory) and a main fixed laboratory, all of which house modern analytical instrumentation and other state of the art equipment.

Emergency Air Monitoring Trailer

Mobile Air Monitoring Laboratory (MAML)

ATAST Activities

- Sample collection for air pollutants
- Sample analyses
- Data assessment of air pollution impacts via modeling during emergency release situations
- Reviews of emissions and emission processes
- Risk Assessments and risk assessment reviews

(1) Air Sample Collection for Pollutants

ATAST is equipped with a variety of air sample collection devices such as SUMMA™ canisters, Tedlar bags, cartridges, detector tubes, etc. These devices permit collection of air samples for real-time measurements and also for time-integrated and grab samples. Six, ten & 30-meter meteorological stations monitor site-specific weather patterns and Global Positioning Systems (GPS) determine the site-specific latitude and longitude and also very accurately identify the locations of the monitoring activities.

ATAST also has personal safety equipment such as, satellite radio/telephone communication equipment, two-way portable radios, laptop computers, reference books and materials, and Standard Operating Procedures (SOP's) for instruments.

(2) Sample Analyses

ATAST capabilities include instruments for identifying and quantifying a wide variety of airborne pollutants.

Direct-reading instruments (real-time monitoring)

The advantage of real-time measurement is that it quickly provides pollutant concentration information so that further assessment can be quickly made. These instruments are user friendly, easy to operate in the field and sensitive to a variety of pollutants.

The ATAST carries an array of direct reading instruments that can be used in the field to quickly assess air quality:

- Detector tubes provide a wide range of screening for both organic and inorganic pollutants.
- The Organic Vapor Analyzer (OVA) can detect total airborne concentrations of organic compounds.
- The Photo Ionization Detectors (PID) monitors air concentrations of hydrocarbons.
- The Electrochemical Detectors are for the determination of oxygen concentration and for specific toxic chemicals, such as oxides of nitrogen, sulfur dioxide, ammonia and chlorine.
- Rae Systems™ are wireless network instruments and can be used for real-time monitoring of total volatile organic compounds (VOC's).
- ToxiRae™ gas monitors can determine a variety of airborne gases. PpbRae™ and miniRae™ are used for trace level VOC's.
- UC Toxic Industrial Material Detector™ is used for arsine, carbon disulfide, and hydrogen cyanide.
- The radiological detector determines alpha, beta, gamma and X-rays.
- Integrating Nephelometers™ are used for an assessment of fine particle ($PM_{2.5}$) air pollution.
- Mercury sampling efforts by ATAST are carried out using a mercury vapor analyzer and a mercury speciation unit.

Mercury vapor analyzer and a mercury speciation unit

Time-integrated sampling and analyses

To support measurements obtained with the direct-reading instruments, often samples are collected in the field and analyses carried out in a laboratory. Time integrated samples are collected during a time-specific interval, for example 4, 8 or 24 hours.

- SUMMA™ canisters and Tedlar bags are used to sample for volatile organic compounds (VOCs). A small amount of the air sample is injected into a Gas Chromatograph Mass Spectrometer (GC/MS). The advantage of using a GC/MS is that it can positively identify many chemicals.
- Specific samplers are available for the less volatile organic compounds (SVOC's). After a sample collection and preparation step, a small amount of the sample is injected into a GC/MS.
- Annular denuders are used to collect acidic and basic gases from air samples with ultimate analysis by ion-chromatography.
- ATAST is also equipped with samplers to collect airborne carbonyls. Carbonyls are a compound class that includes among others, formaldehyde.

ATAST has six GC/MS systems available for air sample analysis for VOC's and SVOC's.

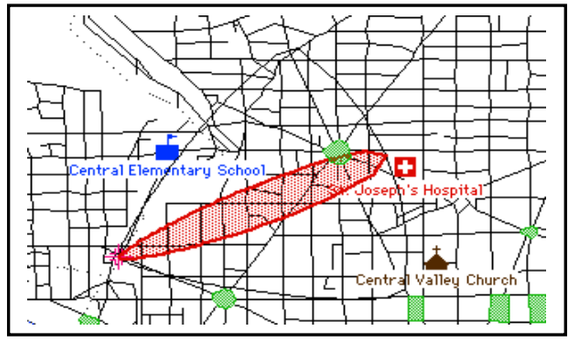
These units represent state-of-art analytical instrumentation and are the workhorses for ATAST air monitoring assessments.

- Three GC/MS systems are bench-top units located in traditional laboratory environments and are used to analyze for airborne contaminants.
- One unit is mounted in a mobile, climate controlled analytical laboratory. This GC/MS is similar to the three bench-top units and provides similar sensitivity for compounds of interest.
- Two portable GC/MS units compliment ATAST's analytical arsenal. One is stationed in the ATAST mobile laboratory to be used for analysis of grab samples and the other is used as a remote sampling and analysis device. Portability is achieved through the use of built in battery packs.

ATAST follows strict field sample collection, sample identification, shipping, packaging, handling, storage and chain-of-custody procedures. Analyses are performed using good laboratory procedures (GLP) and following appropriate quality assurance (QA) and quality control (QC) measures.

(3) Data Interpretation and Modeling

ATAST uses air dispersion modeling as a tool to estimate the downwind airborne concentration of released pollutants. CAMEO®, ALOHA® and MARPLOT® are three distinct programs but when combined, create a system for modeling the concentration and dispersion of released pollutants under certain conditions.



Air Modeling Output Example

(4) Engineering evaluations

ATAST provides resources for a review of emissions, emission factors, and recommendations for source tests, and reviews under the Chemical Accident Prevention Program.

ATAST has also developed a way to use another air dispersion modeling tool to estimate upwind or downwind pollutant concentrations based on monitoring and wind data. This approach expands ATAST's capability to assess the potential threat of a release in situations where CAMEO® would not apply and in areas where sampling and monitoring are ineffective.

(5) Risk Assessment

ATAST also has expertise in environmental health risk assessment.

For further information on the
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NORTH CAROLINA
ATAST
Division of Air Quality
Air Toxics Analytical Support Team

Air Toxics Analytical Support Team (ATAST)

Mission

To conduct air quality investigations to support the North Carolina Division of Air Quality in its goal to protect and improve the outdoor air quality in North Carolina.

NCDENR
North Carolina Department of Environment and Natural Resources