

Spatial and Temporal Concentrations
of Benzene in Two Northern NE
Communities:
A Model Validation Study



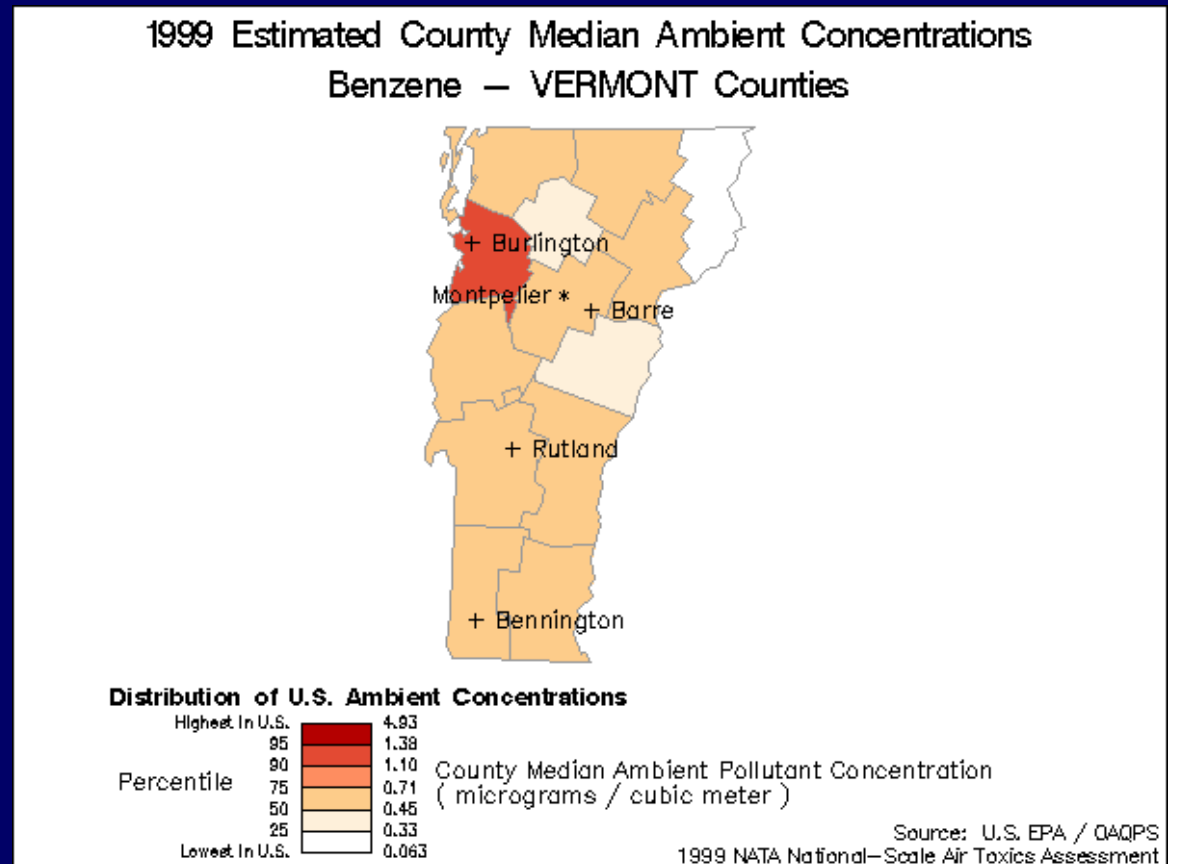
EPA NATA Model

Model Identifies elevated benzene concentrations throughout VT

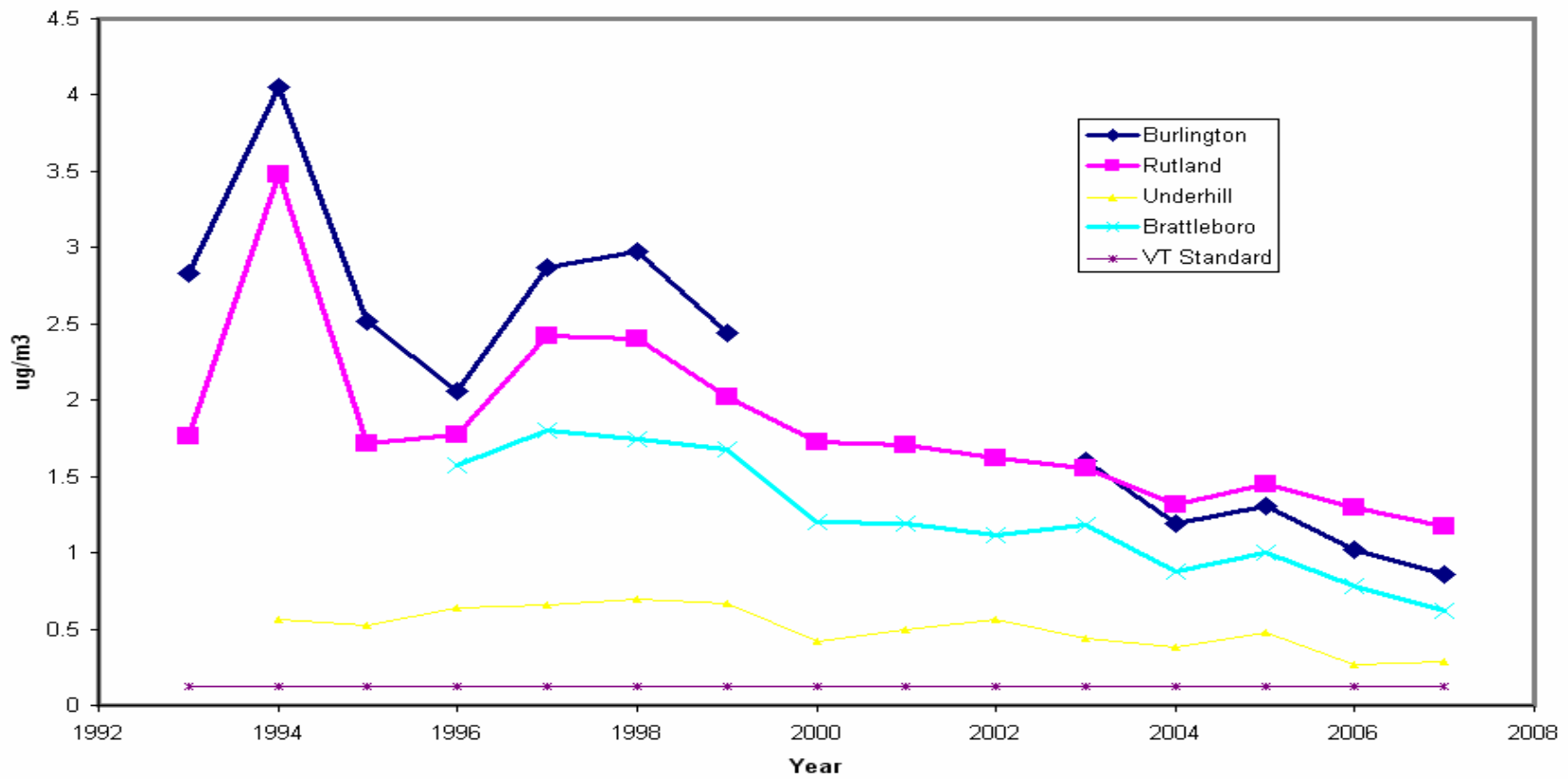
Highest predicted values in Chittenden County
(Median cancer risk 1 in 50,000 for 1999)

Chittenden County is within 90-95% of the highest predicted benzene inhalation exposure in the US

EPA Region 1 identified benzene as 1 of 9 toxics of concern in the Northeast

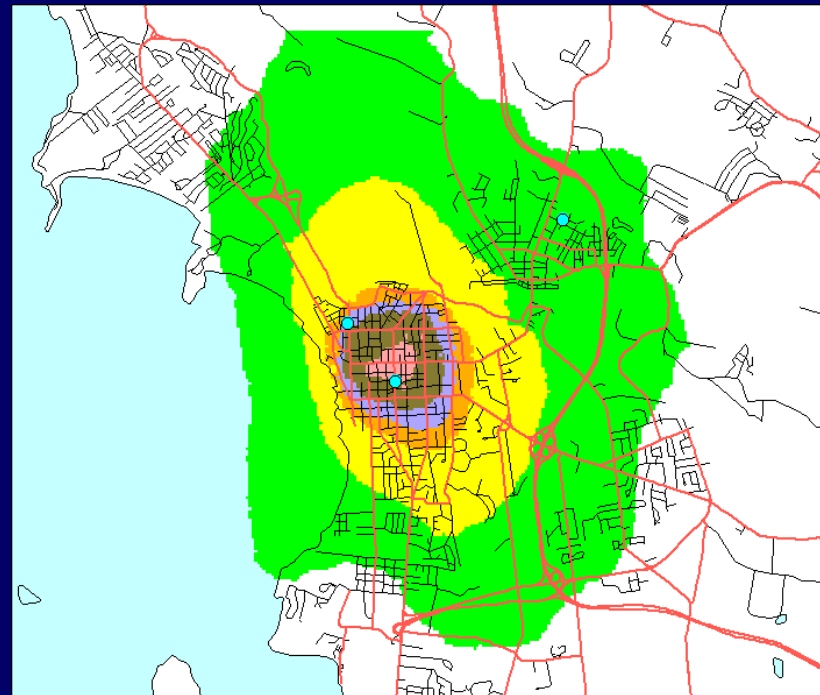


Ambient Air Benzene Concentrations in VT



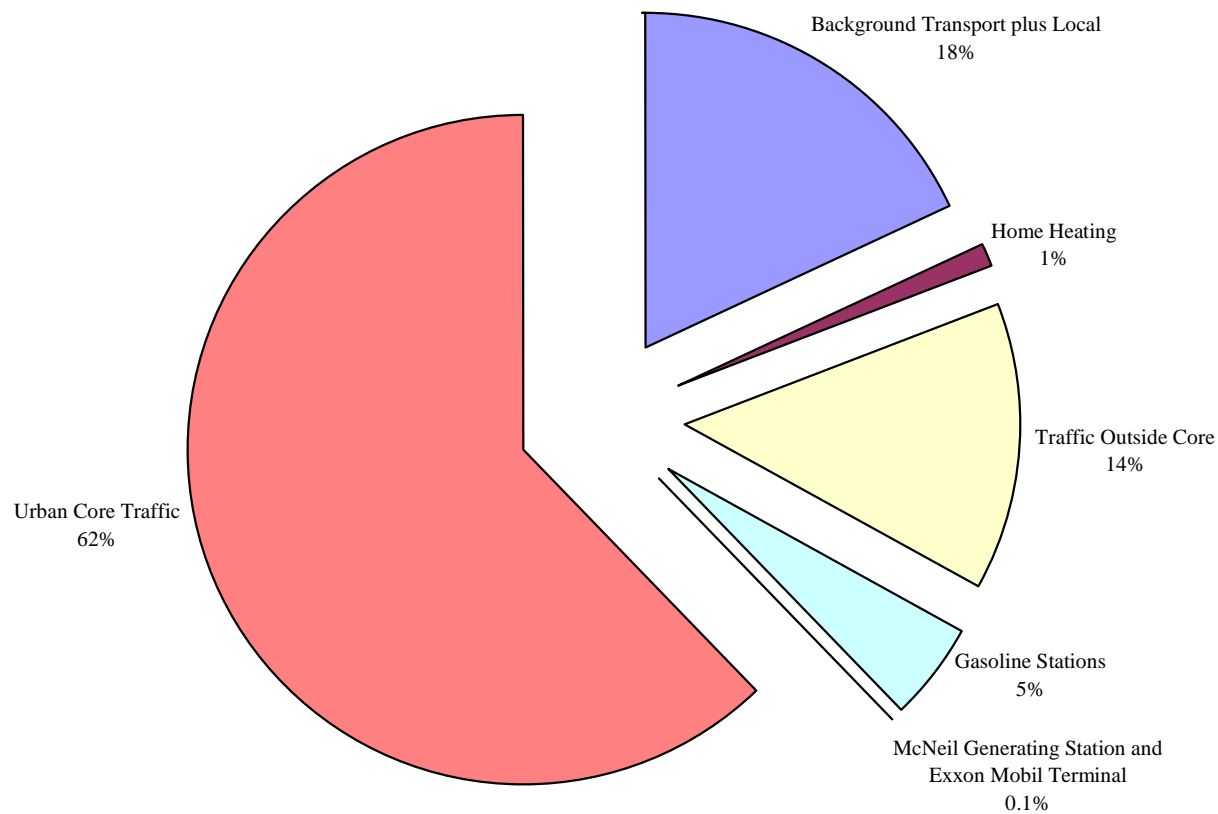
What did we do?

- Burlington Modeling study for 1999
 - Predicted ambient air concentration gradients for benzene at several receptors in Burlington
 - CALPUFF
 - Compared predictions to existing monitor
 - What about other areas in Burlington?
- Great Tool– but we need to validate the model to move forward



Where does benzene come from in Burlington?

Figure ES-1. Percentage of ambient benzene concentrations due to source category. Percentages are based on data collected from the Burlington monitoring station located on S. Winooski and Bank Streets.



Objectives of Study

- Evaluate and refine an air quality modeling platform to estimate spatial gradients and exposure estimates for benzene
 - Spatially and temporally extend data obtained by monitoring program throughout Burlington
 - Evaluate and validate benzene model to assess benzene exposure, conduct risk assessments and develop a strategy to reduce population exposure to benzene
 - Make informed decisions and policies regarding control and management of benzene in ambient air
 - Then, apply model to other areas in NE- Manchester, NH
- Supplement air toxics monitoring data collected over previous 6-12 years
- Characterize degree and extent that benzene (and other VOCs) impact small to medium size urban communities in northern NE



Methods

- Benzene CALPUFF model compared to monitored data
 - Establish additional monitoring sites
 - Analyze, analyze and analyze
- Monitoring began June 2007



1. High Spatial and Temporal Resolution Monitoring

- 7 monitoring locations within 500 meters of permanent monitoring station (downtown core)
- 6 hour samples for 1 week during spring, summer, fall and winter
 - Complete!





7 Intensive 1-week per season 3-Liter TO-15 Sampling Locations (6-hr Samples ●)



Burlington, Vermont Benzene Special Study Monitoring Sites for 2007

7 Mini-Can 6Hr Sampling Locations & duplicate sampler at trailer

BTX Continuous Sampling Location

Standard-Can (TO-15) 24Hr Sampling Location & duplicate

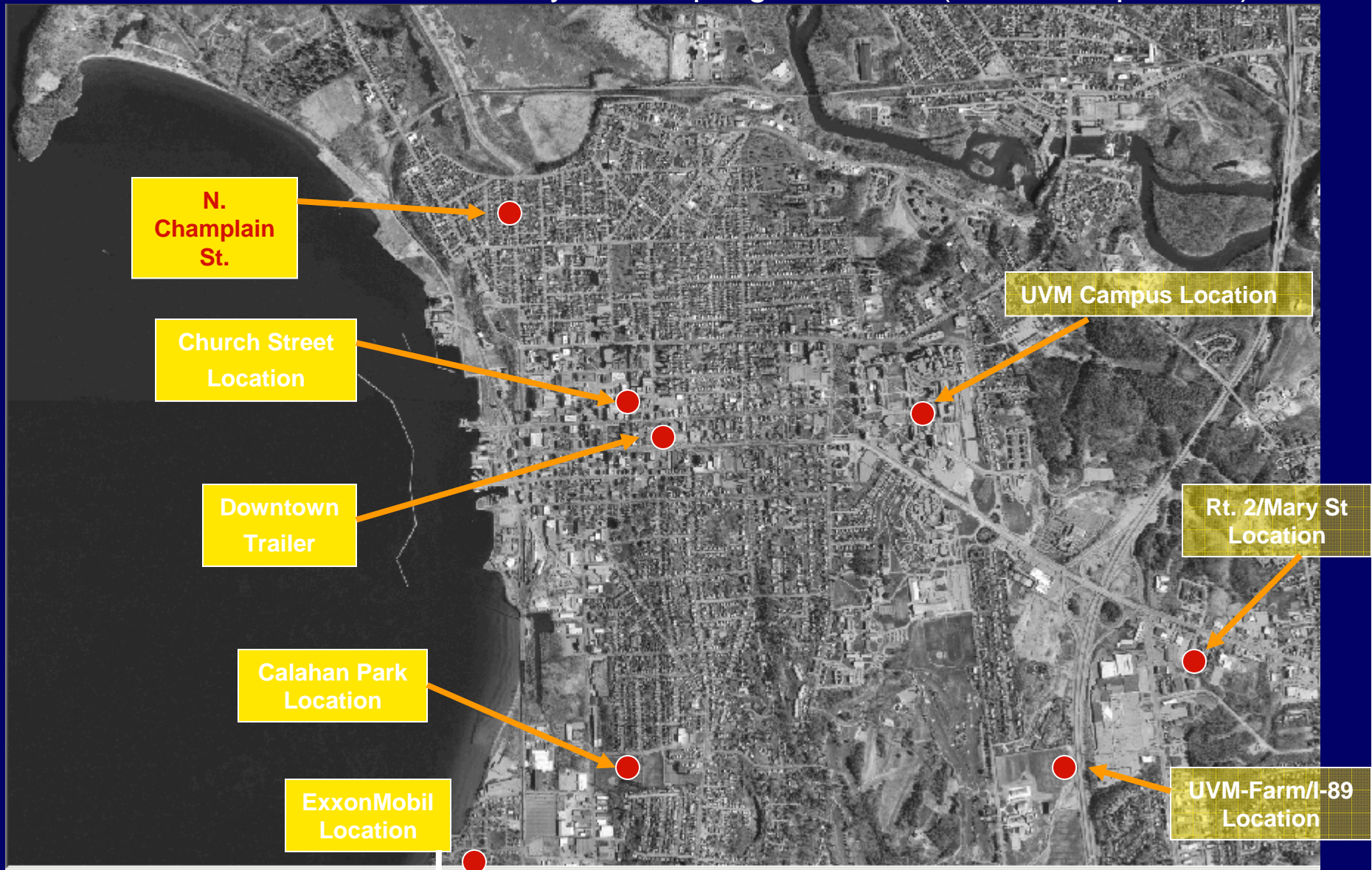
2. Expanded Monitoring Sites



- 7 additional monitoring sites throughout Burlington
 - 24 hour samples, every 12 days
 - Same schedule as our existing monitoring program



8 Standard 6-Liter TO-15 Analysis Sampling Locations (24-hr Samples ●)



Burlington, Vermont Benzene Special Study Monitoring Locations for 2007/2008

3. Semi-continuous BTEX monitoring

- Semi-continuous BTEX installed at Burlington monitoring site (i.e., trailer) for 1 year
- 15 minute averages
- Camera installed

4. Additional Data

- Meteorological Data
- Traffic Count Data
 - Number of vehicles, mix of vehicles, average speed
 - CCTA
 - Camera
- Gasoline Station Activity
- Upgrade benzene emissions inventories
- Gasoline sampling



Cooperative Aspects

- Collaboration with NH
 - Conduct additional canister sampling at 4 sites in Manchester, NH
 - Transfer CALPUFF modeling approach to a Manchester centered domain (next step)



Results and Discussion

- Forthcoming...
- Many delays
 - Hiring staff
 - Accepting funds
 - Sub-contracts
 - Purchasing equipment
 - IT needs



What will be do with data and model validation?

- Identification of potential health hazards due to benzene exposure
- Identification of high-risk areas in typical small NE urban areas
- Work on strategies to reduce benzene exposure
- Gain improved ability to predict benzene exposure to VT and NH residents





THANK YOU!

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