

## Grant Application Package

Opportunity Title:	Community-Scale Air Toxics Ambient Monitoring
Offering Agency:	Environmental Protection Agency
CFDA Number:	66.034
CFDA Description:	Surveys, Studies, Research, Investigations, Demonstrati
Opportunity Number:	EPA-OAR-OAQPS-15-01
Competition ID:	NONE
Opportunity Open Date:	11/07/2014
Opportunity Close Date:	01/05/2015
Agency Contact:	Laurie Trinca, US EPA (Mail Code: C304-06), AQAD/AAMG, Research Triangle Park NC 27711, Phone: (919) 541-0520; Email: Trinca.laurie@epa.gov

This opportunity is only open to organizations, applicants who are submitting grant applications on behalf of a company, state, local or tribal government, academia, or other type of organization.

Application Filing Name:	Evaluation of the Impact of On-Road Mobile Source Air Toxics on Air Quality at Sensitive Receptors Adjacent to Interstate Rte. 95 in Providence
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### Select Forms to Complete

#### Mandatory

[Application for Federal Assistance \(SF-424\)](#)

[Project Narrative Attachment Form](#)

[Budget Information for Non-Construction Programs \(SF-424A\)](#)

#### Optional

[Other Attachments Form](#)

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Application for Federal Assistance SF-424								
<b>* 1. Type of Submission:</b> <input type="checkbox"/> Preapplication <input checked="" type="checkbox"/> Application <input type="checkbox"/> Changed/Corrected Application			<b>* 2. Type of Application:</b> <input checked="" type="checkbox"/> New <input type="checkbox"/> Continuation <input type="checkbox"/> Revision			<b>* If Revision, select appropriate letter(s):</b> _____ <b>* Other (Specify):</b> _____		
<b>* 3. Date Received:</b> Completed by Grants.gov upon submission.			<b>4. Applicant Identifier:</b> _____					
<b>5a. Federal Entity Identifier:</b> _____			<b>5b. Federal Award Identifier:</b> _____					
<b>State Use Only:</b>								
<b>6. Date Received by State:</b> _____			<b>7. State Application Identifier:</b> _____					
<b>8. APPLICANT INFORMATION:</b>								
<b>* a. Legal Name:</b> Rhode Island Department of Environmental Management								
<b>* b. Employer/Taxpayer Identification Number (EIN/TIN):</b> 05-6000522				<b>* c. Organizational DUNS:</b> 1114412130000				
<b>d. Address:</b>								
<b>* Street1:</b> 235 Promenade St.			_____					
<b>Street2:</b>			_____					
<b>* City:</b> Providence			_____					
<b>County/Parish:</b>			_____					
<b>* State:</b>			RI: Rhode Island					
<b>Province:</b>			_____					
<b>* Country:</b>			USA: UNITED STATES					
<b>* Zip / Postal Code:</b> 02908-5767			_____					
<b>e. Organizational Unit:</b>								
<b>Department Name:</b> _____				<b>Division Name:</b> _____				
<b>f. Name and contact information of person to be contacted on matters involving this application:</b>								
<b>Prefix:</b> Ms.			<b>* First Name:</b> Barbara					
<b>Middle Name:</b>			_____					
<b>* Last Name:</b> Morin			_____					
<b>Suffix:</b>			_____					
<b>Title:</b> Supervising Environmental Scientist								
<b>Organizational Affiliation:</b> Office of Air Resources-RI Dept of Environmental Management								
<b>* Telephone Number:</b> (401) 222-4700, ext. 7012			<b>Fax Number:</b> (401) 222-2017					
<b>* Email:</b> barbara.morin@dem.ri.gov								

**Application for Federal Assistance SF-424**

**\* 9. Type of Applicant 1: Select Applicant Type:**

A: State Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

\* Other (specify):

**\* 10. Name of Federal Agency:**

Environmental Protection Agency

**11. Catalog of Federal Domestic Assistance Number:**

66.034

CFDA Title:

Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities  
Relating to the Clean Air Act

**\* 12. Funding Opportunity Number:**

EPA-OAR-OAQPS-15-01

\* Title:

Community-Scale Air Toxics Ambient Monitoring

**13. Competition Identification Number:**

NONE

Title:

**14. Areas Affected by Project (Cities, Counties, States, etc.):**

Add Attachment

Delete Attachment

View Attachment

**\* 15. Descriptive Title of Applicant's Project:**

Evaluation of the Impact of On-Road Mobile Source Air Toxics on Air Quality at Sensitive Receptros  
Adjacent to Interstate Rte. 95 in the Providence Metropolitan Area

Attach supporting documents as specified in agency instructions.

Add Attachments

Delete Attachments

View Attachments

**Application for Federal Assistance SF-424**

**16. Congressional Districts Of:**

\* a. Applicant

\* b. Program/Project

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment

Delete Attachment

View Attachment

**17. Proposed Project:**

\* a. Start Date:

\* b. End Date:

**18. Estimated Funding (\$):**

* a. Federal	<input type="text" value="543,125.00"/>
* b. Applicant	<input type="text" value="0.00"/>
* c. State	<input type="text" value="0.00"/>
* d. Local	<input type="text" value="0.00"/>
* e. Other	<input type="text" value="0.00"/>
* f. Program Income	<input type="text" value="0.00"/>
* g. TOTAL	<input type="text" value="543,125.00"/>

**\* 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

a. This application was made available to the State under the Executive Order 12372 Process for review on

b. Program is subject to E.O. 12372 but has not been selected by the State for review.

c. Program is not covered by E.O. 12372.

**\* 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

Yes  No

If "Yes", provide explanation and attach

Add Attachment

Delete Attachment

View Attachment

**21. \*By signing this application, I certify (1) to the statements contained in the list of certifications\*\* and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances\*\* and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

\*\* I AGREE

\*\* The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

**Authorized Representative:**

Prefix:  \* First Name:

Middle Name:

\* Last Name:

Suffix:

\* Title:

\* Telephone Number:

Fax Number:

\* Email:

\* Signature of Authorized Representative:

\* Date Signed:

## Project Narrative File(s)

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\* Mandatory Project Narrative File Filename:

Add Mandatory Project Narrative File

Delete Mandatory Project Narrative File

View Mandatory Project Narrative File

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To add more Project Narrative File attachments, please use the attachment buttons below.

Add Optional Project Narrative File

Delete Optional Project Narrative File

View Optional Project Narrative File

**BUDGET INFORMATION - Non-Construction Programs**

**SECTION A - BUDGET SUMMARY**

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Community-Scale Air Toxics Monitoring	66.034	\$	\$	\$ 543,125.00	\$ 0.00	\$ 543,125.00
2.						
3.						
4.						
<b>5. Totals</b>		\$	\$	\$ 543,125.00	\$	\$ 543,125.00

**SECTION B - BUDGET CATEGORIES**

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY				Total (5)
	(1)	(2)	(3)	(4)	
	Community-Scale Air Toxics Monitoring				
a. Personnel	\$ 0.00	\$	\$	\$	
b. Fringe Benefits	0.00				
c. Travel	500.00				500.00
d. Equipment	387,969.00				387,969.00
e. Supplies	26,314.00				26,314.00
f. Contractual	100,192.00				100,192.00
g. Construction	0.00				
h. Other	28,150.00				28,150.00
i. Total Direct Charges (sum of 6a-6h)	543,125.00				543,125.00
j. Indirect Charges					
k. TOTALS (sum of 6i and 6j)	\$ 543,125.00	\$	\$	\$	543,125.00
7. Program Income	\$ 0.00	\$	\$	\$	

Authorized for Local Reproduction

**SECTION C - NON-FEDERAL RESOURCES**

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS
8.	\$ 0.00	0.00	0.00	0.00
9.				
10.				
11.				
12. TOTAL (sum of lines 8-11)	\$	\$	\$	\$

**SECTION D - FORECASTED CASH NEEDS**

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	\$ 543,125.00	543,125.00	0.00	0.00	0.00
14. Non-Federal	\$				
15. TOTAL (sum of lines 13 and 14)	\$ 543,125.00	543,125.00	0.00	0.00	0.00

**SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT**

(a) Grant Program	FUTURE FUNDING PERIODS (YEARS)			
	(b) First	(c) Second	(d) Third	(e) Fourth
16.	\$ 0.00	0.00	0.00	0.00
17.				
18.				
19.				
20. TOTAL (sum of lines 16 - 19)	\$	\$	\$	\$

**SECTION F - OTHER BUDGET INFORMATION**

21. Direct Charges:

22. Indirect Charges:

23. Remarks:



1. Summary Information

- a. Project Title: Evaluation of the Impact of On-Road Mobile Source Air Toxics on Air Quality at Sensitive Receptors Adjacent to Interstate Rte. 95 in the Providence Metropolitan Area
- b. Applicant: Rhode Island Department of Environmental Management  
Office of Air Resources  
  
Contact: Barbara Morin, Supervising Environmental Scientist  
Rhode Island Department of Environmental Management  
Office of Air Resources  
235 Promenade St.  
Providence, RI 02908  
[barbara.morin@dem.ri.gov](mailto:barbara.morin@dem.ri.gov)  
(401) 222-4700, ext. 7012  
(401) 222-2017 (fax)
- c. Funding Requested: \$543,125
- d. Total Project Cost: \$543,125
- e. Project Period: 4/1/14 – 12/31/15
- f. DUNS number: 111441213

2. Narrative Proposal Work-Plan

a. Basis and Rationale

The Rhode Island Department of Environmental Management Office of Air Resources (RI DEM OAR) is proposing to characterize levels of ultrafine particles (UFP, measured as particle count (PC)), black carbon (BC, an indicator of diesel particulate) and volatile organic compounds (VOCs) in the vicinity of schools, residences and recreational facilities located adjacent to Interstate Route 95 (I-95) in the Providence metropolitan area. This project addresses Category 2 of the Community-Scale Air Toxics Ambient Monitoring RFP, “Monitoring in the Near-Road Environment.”

The rationale for this study is as follows.

**Location:** I-95 passes through the heart of the Providence area, including areas with the highest poverty rates in the State. Residential neighborhoods, schools and recreational facilities are located adjacent to the highway.

**Monitoring data:** As required by the National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide (NO<sub>2</sub>), RI DEM established a near-road (NR) air monitoring site adjacent to I-95 in Providence in April 2014. The NR site, which is five meters from and generally downwind of the section of I-95 with the highest traffic volume and congestion, was chosen to represent worst-case mobile source impacts. In the first 7 months of operation, maximum daily one-hour concentrations of NO<sub>2</sub> and carbon monoxide at the NR site were, on

average, 2-3 times higher than at nearby sites not adjacent to the highway. Maximum levels of nitric oxide (NO), an indicator of fresh combustion, were, on average, 8-12 times higher than at the other sites<sup>1</sup>.

During the same time period, 24-hour average and maximum daily one-hour concentrations of fine particles (PM<sub>2.5</sub>) at the NR site were 2 µg/m<sup>3</sup> and 3 µg/m<sup>3</sup> higher, respectively, than at the nearby National Air Toxics Trends Site (NATTS) (see Figure 1) and BC and PC levels were dramatically elevated at the NR site relative to those at the NATTS site and the State's NCore site in E. Providence. PM<sub>2.5</sub>, BC and PC levels at the NR site were particularly elevated during the morning rush hour (see Figures 2-4).

Rhode Island measures VOC, PM<sub>2.5</sub>, and coarse particles (PM<sub>10</sub>) at a site adjacent to I-95 on Vernon St. in Pawtucket, approximately 3.5 miles NNW of the NR site. The Vernon St. site did not meet EPA's criteria for near-road NAAQS monitoring because Annual Average Daily Traffic (AADT) volume on I-95 at that location is approximately 80% of the AADT at the NR site location. PM<sub>2.5</sub> and PM<sub>10</sub> concentrations at the Vernon St. site tend to be higher than at other nearby urban sites. Concentrations of mobile source VOCs, including the carcinogens benzene and 1,3-butadiene and the potent respiratory irritant acrolein, are substantially higher at the Vernon St. site than at other sites, including the NATTS site (see Figure 5).

**Modeling data:** EPA's NATA modeling of 2005 emissions data similarly shows elevated levels of mobile source air toxics and elevated cancer and respiratory risk in Providence area census tracts that are adjacent to I-95, as shown in Table 1. The pollutants associated with the highest cancer risks were formaldehyde and benzene, and mobile source emissions were responsible for 12-28% of formaldehyde and 38-63% of benzene concentrations. Acrolein contributed 78 – 86% of respiratory risk, and 13-29% of acrolein levels in the tracts adjacent to highways were associated with on-road mobile sources. Diesel particulate is not included in the 2005 NATA's calculation of total risk, but predicted diesel concentrations are substantially elevated in tracts that are adjacent to highways. Note that these data are averages across the census tracts; mobile source impacts are likely considerably higher in the areas of the tracts that are nearest to the roadways.

**Asthma data:** RI Department of Health (HEALTH) data<sup>2</sup> show an elevated percentage of children with asthma health claims in some Providence area census tracts, including those adjacent to I-95 (see Table 1 and Figure 6). A variety of factors may contribute to that disparity, including poverty and age of housing stock, but this finding provides impetus to gaining a better understanding of levels and sources of air pollution in those areas.

**Rhode Island data needs:** RI DEM is periodically asked to evaluate highway impacts on air quality at sensitive receptors, particularly schools. Although factors that affect the magnitude and spatial extent of highway impacts have been identified, it is difficult to predict impacts at a particular location. The data collected in this study would enable RI DEM to make better informed recommendations to schools and other sensitive receptors located or proposed to be located near the highway. In addition, with the monitoring equipment purchased for this study, RI DEM will be able to address future near-road exposure questions as they arise.

**Applicability to other areas:** Although each metropolitan area has a unique set of characteristics, the proposed Rhode Island study would, by adding to the current body of knowledge concerning spatial variability of near-road impacts, aid other states in evaluation of those impacts in their communities. This information may be particularly important to states which, like Rhode Island, measure elevated toxics levels at their near-road sites but do not know the extent to which those levels continue to be elevated in areas where people are exposed.

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<sup>1</sup> NR site NO<sub>2</sub> data were compared to measurements at the Brown University, Providence and Francis School, E. Providence sites. CO data were compared to measurements at the E. Providence site

<sup>2</sup> Rhode Island Department of Health and Providence Plan, *Asthma Claims Data Book 2014*.  
<http://www.health.ri.gov/publications/databooks/2014AsthmaClaims.pdf>

**Pollutant selection:** RI DEM chose to focus this study on the measurement of PC, BC and VOCs. PM<sub>2.5</sub> was not chosen because, while PM<sub>2.5</sub> concentrations at the NR site and the Vernon St. site tend to be higher than similar measurements at nearby urban sites that are not adjacent to the highway, those levels, along with the levels of other criteria pollutants measured, do not violate applicable NAAQS. Therefore, monitoring of PM<sub>2.5</sub> at additional locations would be unlikely to document health concerns.

PC, as a measure of UFP, was chosen after considering the health effects, data needs and the contribution of mobile sources associated with that pollutant. Exposure to UFP is linked to respiratory and cardiac health effects and to brain inflammation. These effects tend to be particularly pronounced in children and in people with compromised respiratory systems, such as asthmatics. UFP tends to be enriched in toxic species, and, due to UFP's large surface area to size ratio, those toxics are more bioavailable than is the case for larger particles. According to a 2013 Health Effects Institute (HEI) data review<sup>3</sup>, epidemiological studies assessing the health impacts of exposure to UFPs have been limited by the fact that "ambient monitoring of UFPs has not been conducted in most locations." The HEI study further states that, "in urban areas, particularly in proximity to major roads, motor vehicle exhaust can be identified as the major contributor to UFP concentrations. Diesel vehicles have been found to contribute substantially, sometimes in disproportion to their numbers in the vehicle fleet." PC levels tend to fall off relatively quickly with distance from roadways, but the spatial extent of PC impacts at a particular location is affected by a variety of factors. In this study, PC measurements taken at the fixed sites and with hand-held devices, in conjunction with the data collected at the current sites, will allow RI DEM to determine the spatial extent and factors mitigating impacts of UFP emissions from highway vehicles.

BC was chosen as an indicator of diesel exhaust. In the 2005 NATA analysis, diesel emissions were associated with 7% of cancer risk and 27% of respiratory risk from on-road mobile sources in the Providence area. Percentages may be higher in the near-road environment. As discussed previously, BC levels measured at the NR site are substantially higher than those at the NATTS and NCore sites. In this study, BC measurements taken at the fixed sites and with hand-held devices, in conjunction with the data collected at the current sites, will allow RI DEM to determine the spatial extent and factors mitigating impacts of diesel emissions from highway vehicles.

Measuring VOCs will allow RI DEM to better characterize levels of benzene, 1,3-butadiene, acrolein, and other VOC air toxics at near-road receptors. As discussed above, mobile source-related VOCs tend to be higher at the Vernon St., Pawtucket site, adjacent to I-95, than at the NATTS and NCore site.

Note that, although the NATA analysis attributes a significant carcinogenic and, to a lesser extent, respiratory risk to formaldehyde and acetaldehyde exposures, RI DEM is not proposing to sample for carbonyls in this study. In a 2001-2002 study, carbonyls were measured for a one-year period at five sites in the Providence metropolitan area, including Vernon St.; Urban League, the current NATTS site; and the E. Providence site that is now the NCore site. As shown in the Figure 7, concentrations of those pollutants at the Vernon St. site were not different than those at the Urban League site and tended to be lower than those at the E. Providence site. Ambient formaldehyde concentrations are highly influenced by photochemical formation reactions and peak in the hot summer months. Rhode Island continues to sample for carbonyls at the NATTS and NCore site.

#### b. Technical Approach

RI DEM is proposing to monitor PC, BC and VOCs in the vicinity of schools, residences and recreational facilities located adjacent to I-95 in the Providence metropolitan area. Monitoring would be conducted both at

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<sup>3</sup> HEI Review Panel on Ultrafine Particles, "Understanding the Health Effects of Ambient Ultrafine Particles," HEI Perspectives 3, Boston, January 2013. <http://pubs.healtheffects.org/getfile.php?u=893>

fixed monitoring sites and using hand-held instruments. This project addresses Category 2 of the Community-Scale Air Toxics Ambient Monitoring RFP, "Monitoring in the Near-Road Environment."

The objectives of this study are as follows:

- To characterize ambient air levels of PC, BC and VOCs at locations adjacent to I-95 where exposures to residents, particularly children, occur, as well as at the State's established NR site. The NR site reflects maximum impacts from traffic on I-95 but is not in an area that is accessible to the public.
- To identify the contribution of highway traffic to those pollutant concentrations using meteorological data, traffic data, and concurrent measurements of those pollutants at the State's NATTS and NCore sites.
- To use the data obtained from the fixed monitors, along with measurements using hand-held instruments, to better define the spatial variability of highway traffic impacts in the Providence area, considering factors such as distance from the roadway, meteorology, the height of the roadway relative to neighboring land, and the presence of obstructions.
- To ensure that the study addresses community concerns and that the data collected, along with recommendations for minimization of current and future near-road exposures, are communicated to the public and to decision makers.
- To provide comprehensive monitoring data to HEALTH and other parties for evaluation of highway impacts and for use in studies on the effect of air pollutants on health outcomes, including cancer and respiratory disease.
- To identify pollutants for long-term monitoring at the NR site, at the Vernon St. site, and/or at other locations to track trends in air quality associated with future changes in the vehicle fleet, fuels, traffic volumes, land use, and climate change.

The study will be designed as follows:

In consultation with interested parties, five fixed monitoring sites will be identified. To leverage existing resources, the NR and Vernon St. sites will be used as two of those sites. The Vernon St. site is adjacent to residences. The remaining three sites will be chosen considering the following factors:

- Proximity of receptor (e.g. residence, school, or recreational facility) to I-95;
- Relative heights of I-95 and receptor and presence of trees and others obstructions;
- Vehicle volume, truck volume and congestion;
- NATA mobile source risk predictions, as discussed above;
- Demographics such as poverty levels in areas around the receptor;
- HEALTH asthma data, as discussed above; and
- Community concerns/recommendations.

An initial compilation of these data is shown in Table 1. The State's Air Toxics QAPP will be updated to include all measurements in this study.

A particle counter, an Aethalometer BC monitor, a VOC sampler and wind speed/ wind direction sensors will be operated at each of the five sites for one year. These parameters are measured at the NATTS and NCore sites, so data from those sites will be used for comparison with study data. At all study sites except the NR site, monitors will be housed in EKTO shelters.

PC, BC and meteorological parameters will be monitored continuously. A 24-hour VOC sample will be collected at each site every 6<sup>th</sup> day according to the monitoring schedules at the existing sites. In addition, at least two 3-hour VOC samples will be collected concurrently at each site each month during the morning rush hour. VOC samples will be analyzed using Method TO-15 by the HEALTH Air Pollution Laboratory (APL).

Portable particle counters and MicroAeth hand-held Aethalometers will be used to aid in site selection and to measure PC and BC concentration gradients in the vicinity of the fixed monitors and other near-road locations. Monitoring with the portable devices will be conducted on at least two days in different seasons at each fixed monitoring site and at three other near-road locations. The location of measurements relative to the highway, receptors and obstructions will be noted in order to evaluate the impacts of these factors on pollutant levels.

RI DEM has access to INRIX traffic speed data at one-minute intervals for all significant roadways in Rhode Island, which allow for highly resolved congestion determinations. Daily traffic volumes are collected by the RI Department of Transportation (RI DOT) at 19 locations on I-95 in the State, including eleven locations in the Providence-Pawtucket metropolitan area. RI DOT also will supply truck volume data for those sites.

All monitoring, meteorological and traffic data will be uploaded into an Access database and will be analyzed as discussed below. The results of the data analysis, along with conclusions and recommendations, will be presented to the EPA in an interim and final report and at a community meeting. Recommendations may address reduction of existing impacts, siting considerations, and the need for additional long-term monitoring.

#### c. Data Analysis

All monitoring data collected, along with the meteorological data and traffic data, will be uploaded into an Access database. The following analyses will be conducted to address the first 3 study objectives listed above (characterizing pollutant levels, identifying highway emissions contributions, and better defining factors affecting spatial variability):

- Inter-site comparison of concentrations of mobile source VOCs, including the BTEX compounds, 1,3-butadiene, hexane and acrolein, in 3-hour and 24-hour samples at the study and comparison (NATTS and NCore) sites. Interpretation of site to site and day to day differences will consider seasonality, local meteorological conditions, traffic volume, truck traffic volume, congestion and other pertinent factors (e.g. nearby construction activities).
- Comparison of annual average VOC levels at each fixed site to chronic cancer and noncancer health benchmarks and comparison of maximum values to acute health benchmarks.
- Comparison of PC and BC levels at the study and comparison sites. Analysis of effect of time of day, meteorology, season, traffic, and other sources, like construction activities, on levels at each site. Continuous data are valuable for analyses of this type due to the large amount of highly time resolved data generated by those methods.
- Analysis of data from the portable BC and PC monitors will include comparison to concurrent fixed site readings and correlation with distance from highway, altitude relative to the highway, traffic, meteorology, and the presence of obstructions.

#### d. Environmental Justice Impacts

Census tracts in the Providence area bordering I-95 have some of the highest poverty rates and highest

percentages of African American and Hispanic residents in the State. As previously discussed, air pollution-related cancer and respiratory risk, as modeled by EPA, and pediatric asthma claims, as predicted by RI HEALTH, are also elevated in those areas. RI has compiled those data for Providence area census tracts adjacent to I-95 and will consider those factors, along with the location of sensitive receptors relative to the highway and community input, when choosing the fixed monitoring sites and areas to monitor with the portable devices.

RI DEM is particularly interested in measuring highway impacts on schools and recreational facilities because of the large number of children exposed at those locations. One such location is the Young & Woods Elementary Schools, which share a building with a recreational facility approximately 300 m from I-95. The building is located in a census tract that has a 45% poverty rate and a population that is 37% African American and 63% Hispanic. Only 5% of the students in the school are non-Hispanic White and 85% are eligible for subsidized lunches.

In 2010, RI DEM conducted monitoring in and around the Vartan Gregorian Elementary School, which is adjacent to I-195 in Providence, at the request of concerned parents. Although resources were limited at that time, RI DEM demonstrated that PC impacts on the side of the school nearest to the highway were significantly higher than on the other side. This information was presented to the principal, the parent teacher organization, and at a community meeting. The school considered these results when siting a new play area and trees were planted between the highway and the school property to decrease impacts from highway pollutants.

Although the parents of children at schools like Young & Woods may not have the resources available to those at Gregorian, the monitoring data collected in this study will provide that school with valuable information that can be used to reduce unnecessary pollutant exposures. RI DEM will work with representatives of monitored facilities and with community groups to ensure that the study addresses community concerns and that the results and recommendations are widely communicated. At the end of the study, the monitors, including the hand-held equipment, will be available to address future issues identified by community members.

#### e. Community Collaboration/Outreach

During the preparation of this proposal, RI DEM communicated with the Environmental Justice League (EJL) and Groundwork Providence (GWP), two Providence non-profit organizations. The EJL's mission is to "promote environmental justice in Rhode Island through advocacy, education, networking, organizing, and research and" GWP's is "to foster and awaken the potential of neighborhoods by working in conjunction with residents and businesses to improve the physical environment in economically struggling neighborhoods." At the suggestion of these organizations, RI DEM focused the proposed study on schools and similar facilities.

RI DEM is an ex officio member of the RI Commission for Health Advocacy and Equity (RICHAЕ), a group composed of representatives from a variety of community groups and state agencies with the goal of eliminating health disparities in the State. RI DEM discussed its intentions to apply for this grant at a Commission meeting and plans to continue that discussion as the project is implemented.

RI DEM has also begun to contact representatives of the schools and other facilities where monitoring may occur. The Providence Public School Department has given initial approval for sampling at the Young & Woods Elementary Schools. Preliminary contact has been positive with the Meeting Street School, which owns the land on which the South Side Soccer Field, which is immediately adjacent to I-95, is located. If this study is funded, RI DEM will actively pursue obtaining permission to establish a site near that field.

Throughout the study, RI DEM will consult with the EJL, GWP, the RICHAЕ, and all schools and other facilities that are included in the study, as well as with other interested parties. The consultation will include, at

a minimum, requesting input on site selection for fixed and hand-held monitoring and on the interpretation and presentation of results and recommendations. In addition, RI DEM will offer the schools and other organizations an opportunity to observe or participate in sampling activities. After the study is completed, the equipment will be available for further cooperative projects with those groups.

f. Environmental Results: Outcomes, Outputs, Performance Measures

1. Linkage to EPA Strategic Plan

While addressing climate change is not its primary objective, the proposed project is consistent with Goal 1, Objective 1.1 of EPA's 2014-1018 Strategic Plan, "Address Climate Change." In this study, RI DEM will better define the meteorological conditions associated with elevated levels of air pollutants in areas near I-95. The study will also make recommendation for long-term monitoring to track trends in pollution levels over time as vehicles, fuels and the climate changes. The linkage to Objective 1.2, "Improve Air Quality" is more straightforward. The study will allow RI DEM to characterize the impacts of highway emissions on sensitive receptors and to recommend mitigation measures and siting considerations to limit current and future exposures to those pollutants.

2. Outputs

Outputs for this project include the following:

- One-hour average BC, PC, wind speed and wind direction data and 3-hour and 24-hour average VOC data generated at the five fixed stations will be input into the EPA's AQS database by 90 days after the end of each calendar quarter.
- All relevant pollutant measurements and meteorological and traffic data will be uploaded to an Access database which will be used for data analysis and will be available to researchers and other interested parties.
- A profile will be produced for each sampling location, including a site description, pollutant information, an analysis of the conditions that affect air pollutant levels at that location and, if applicable, recommendations for minimizing exposures.
- An interim final report will be submitted to EPA at the conclusion of the one-year monitoring period. The interim report will include documentation of the degree to which the output goals and objectives were met and a prognosis for the achievement of short- and mid-term project outcomes, as presented below.
- A final report will be submitted to the EPA no more than nine months after submittal of the interim report and will include, along with the material in the interim report, a prognosis for the achievement of mid and long-term outcomes will be achieved.
- The final report will also include the results of the study analysis, along with recommendations for minimizing current and future risk and for future monitoring. This information will also be presented at a public meeting.
- RI DEM will supply the results and recommendations to and will offer to meet with representatives of the facilities monitored to review those recommendations.

3. Outcomes

Short-term outcomes for this project include:

- Working with community partners to identify sites and conditions of concern.
- Increasing community awareness about the issue of near-road exposures.

- Collecting pollutant and meteorological data to be used, with traffic data, to determine the nature and extent of impacts of highway emissions on sensitive receptors located near I-95.

Mid-term outcomes include:

- Using the data to understand the impacts of highway emissions at sensitive receptors located near I-95 in the Providence metropolitan area and the factors that affect those impacts.
- Disseminating that information to the public so that affected parties and community organizations have accurate information on which to base actions.
- Developing recommendations concerning mitigation procedures for existing sensitive receptors, where applicable and for siting of future sensitive receptors.
- Developing recommendations for future and long-term monitoring.
- Providing data to HEALTH, health researchers, other states, and other interested parties.

Long-term outcomes include:

- Reducing ambient levels of air pollutants in the near-road environment.
- Reducing exposures of members of the public to pollutants from highway vehicles.

The mid-term and short-term outcomes are linked since the establishment of a monitoring network and an effective relationship with community partners is necessary to obtain data that address community concerns, lead to an understanding of highway impacts and allow for developing appropriate recommendations. Note that RI DEM will submit interim final and final report to the EPA detailing the prognosis for achieving the outcomes, as discussed above.

#### 4. Performance Measures

The project will achieve the following measurable results:

- Quality-assured BC, PC, VOC, wind speed and wind direction data collected at 5 fixed stations for a one-year period will be input into AQS by 90 days after each calendar quarter.
- BC and PC data collected at each fixed site on 2 days and at three additional near-road sites using hand-held instruments will be collated and summarized.
- An Access database that includes pollutant measurements as well as meteorological and traffic data will be created to be used for analyses and for future research.
- Reports summarizing results, conclusions and recommendations, including profiles of each sampling location, will be produced.

#### g. Programmatic Capability and Past Performance

In the past three years, RI DEM OAR, has received the following relevant EPA grants:

- Section 103 grant, renewed annually, to measure air toxics, including VOCs, carbonyls, BC and SVOCs at the Providence NATTS site.
- Section 103 grant, renewed annually, to operate and analyze data collected by the State's PM<sub>2.5</sub> monitoring network.
- Section 103 grant for the installation of a near-road monitoring station.



RI DEM fulfills the commitments in those grants, including annual updates of QAPPs; siting and operation of equipment according to EPA specifications; timely entry of data into EPA's AQS database; and submittal of annual network monitoring plans and five year network reviews.

RI DEM OAR received and successfully executed two Community-Scale Air Toxics Ambient Monitoring grants and submitted final reports and presented results and conclusions as required.

Key personnel for this project will include:

- Barbara Morin, a Supervising Environmental Scientist in the OAR, with 30 years of experience in air toxics, planning and ambient air characterization, will be the Project Manager. She manages the Section 103 grants listed above and was the project manager of the State's two previous Community-Scale Air Toxics Ambient Monitoring grants. She has a BS in Applied Biology from the Massachusetts Institute of Technology and a MS in Environmental Health Sciences, with concentrations in Air Pollution Control and Industrial Hygiene, from the Harvard School of Public Health
- Roy Heaton, PhD, Principal Registered Environmental Laboratory Scientist in the HEALTH APL, has more than 25 years of experience in ambient monitoring of criteria pollutants, VOCs and carbonyls. Roy is responsible for the NCore and NATTS monitoring sites and worked on the previous air toxics monitoring projects. He has a BS in Chemistry from the University of Massachusetts and a PhD in Analytical Chemistry from the University of Rhode Island
- Melinda Viera, Supervising Registered Environmental Laboratory Scientist, manages the APL, where she has worked for 14 years. She has a BS in Biology from Rivier College.

#### h. Detailed Budget

As shown in the budget table below, 81% of the funds for this project will be used to purchase monitors and related supplies and to set up sites and 18% to pay a contract employee for one year to perform monitoring field work, including setting up and retrieving VOC canisters, downloading data from wind speed/wind direction sensors, maintaining fixed site Aethalometers and particle counters, and performing the studies with the hand-held equipment. RI DEM OAR and HEALTH APL staff resources will be leveraged to perform remaining duties related to this study and the study will use equipment that has been previously purchased, as discussed in Section i. below.

#### i. Leveraging

Although RI DEM is not proposing a formal cost share, existing State personnel, equipment and other resources will be leveraged for this project, as follows:

##### Personnel leveraged

Responsibilities of RI DEM OAR and HEALTH APL personnel, financed through a combination of state and federal grants, will include: managing the project; ordering equipment and supplies; modifying the QAPP; interfacing with the public; obtaining permission to site monitors and arranging for installation; training and supervising the contract employee; assisting in the studies with the hand-help instruments; analyzing the VOC samples; uploading data to AQS, creating and populating the Access database; analyzing and interpreting the data; writing reports and recommendations; and presenting the findings. Note that the HEALTH APL is fully funded through a cooperative agreement with RI DEM. Staff time commitments are estimated as follows:

<u>RIDEM - OAR</u>		<u>HEALTH- APL</u>	
Supervising Environmental Scientist	0.2 FTE	Supervising Laboratory Scientist	0.1 FTE
Principal Air Quality Specialist	0.1 FTE	Principal Laboratory Scientist	0.2 FTE
Senior Air Quality Specialist	0.1 FTE	Senior Laboratory Scientist	0.1 FTE
		Laboratory Scientist	0.1 FTE

Equipment leveraged

The following previously purchased equipment will be used in this study: Xontech VOC monitor (Vernon Street site), walk-in monitoring shelter (NR site), meteorological equipment (NR site), portable particle counters, and gas chromatograph/mass spectrometer and attendant supplies for VOC analysis

Budget Table - Requested EPA Funding

<b>PERSONNEL</b>	\$0			\$0
<b>FRINGE BENEFITS</b>	\$0			\$0
<b>TRAVEL</b>				
Travel to monitors			\$500	\$500
<b>EQUIPMENT</b>	unit cost	number	total cost	
Aethalometers - Model 633 (includes 1 co-lo)	\$25,000	6	\$150,000	
TSI 3783 Particle Counter, Model 651 (includes 1 co-lo)	\$26,614	6	\$159,684	
EKTO Shelters (42"H X 32"D X 30"W) (not needed at NR site)	\$7,040	4	\$28,160	
Xontech VOC samplers, Model 910 (not needed at Vernon site)	\$8,035	4	\$32,140	
AethLabs MicroAeth samplers w/ 5 filter strips, cable, software	\$5,995	3	\$17,985	\$387,969
<b>SUPPLIES</b>	unit cost	number	total cost	
Aethalometer inlets, parts, tapes	\$1,909	6	\$11,454	
Particle counter inlets, parts	\$611	6	\$3,666	
Wind speed/wind direction (WS/WD) sensors (not needed at NR site)	\$585	4	\$2,340	
WS/WD parts and mounting	\$729	4	\$2,914	
Data logger to record WS/WD data	\$660	4	\$2,640	
Laptop computer for collecting WS/WD data	\$1,000	1	\$1,000	
25 MicroAeth filter strips	\$150	2	\$300	
Miscellaneous Supplies			\$2,000	\$26,314
<b>CONTRACTUAL</b>	Cost/hour	Hours		
Contract Employee (T-1 level from RI DEM TAC contract)	\$58	1820	\$100,192	\$100,192
<b>OTHER</b>				
Site set-up			\$26,150	
Electricity for site operation			\$2,000	\$28,150
<b>TOTAL DIRECT</b>				\$43,125
<b>INDIRECT</b>				\$0
<b>TOTAL</b>				\$543,125

**Rhode Island Department of Environmental Management**

**Community-Scale Air Toxics Monitoring Proposal**

**Attachments**

Table 1 Characteristics of Census Tracts Abutting I-95 in Providence Area

Census Tract	NATA On-road Mobile Cancer Risk Rank <sup>1</sup>	NATA On-Road Mobile Resp. Risk Rank	Asthma Claim Category <sup>2</sup>	% Poverty <sup>3</sup>	% African American	% Hispanic	Receptors/Notes
2	22	23	2	37	14	72	Residences
5	28	24	1	45	37	63	Young & Wood
6	5	5	2	19	41	28	Meeting St. Schl /Field
7	10	11	2	56	22	52	Travelers Aid
8	1	1	3	38	10	14	NR Site
9	6	6	1	38	9	23	UCAP School
25	20	21	2	22	6	39	Residences
26	29	27	1	43	21	39	Residences
29	24	26	2	20	23	34	Residences
31	4	3	3	36	27	9	Residences
33	12	14	5	4	4	5	Residences
137.01	9	9	4	14	8	15	Doric Park
142	13	13	4	13	13	14	Residences
152	32	31	1	36	27	25	Residences
153	2	2	4	16	31	24	Residences
161	14	12	4	36	29	20	Residences
167	16	16	3	24	12	25	Residences/Vernon Site

<sup>1</sup> Risk Ranks from 2005 NATA – RI has a total of 234 census tracts.

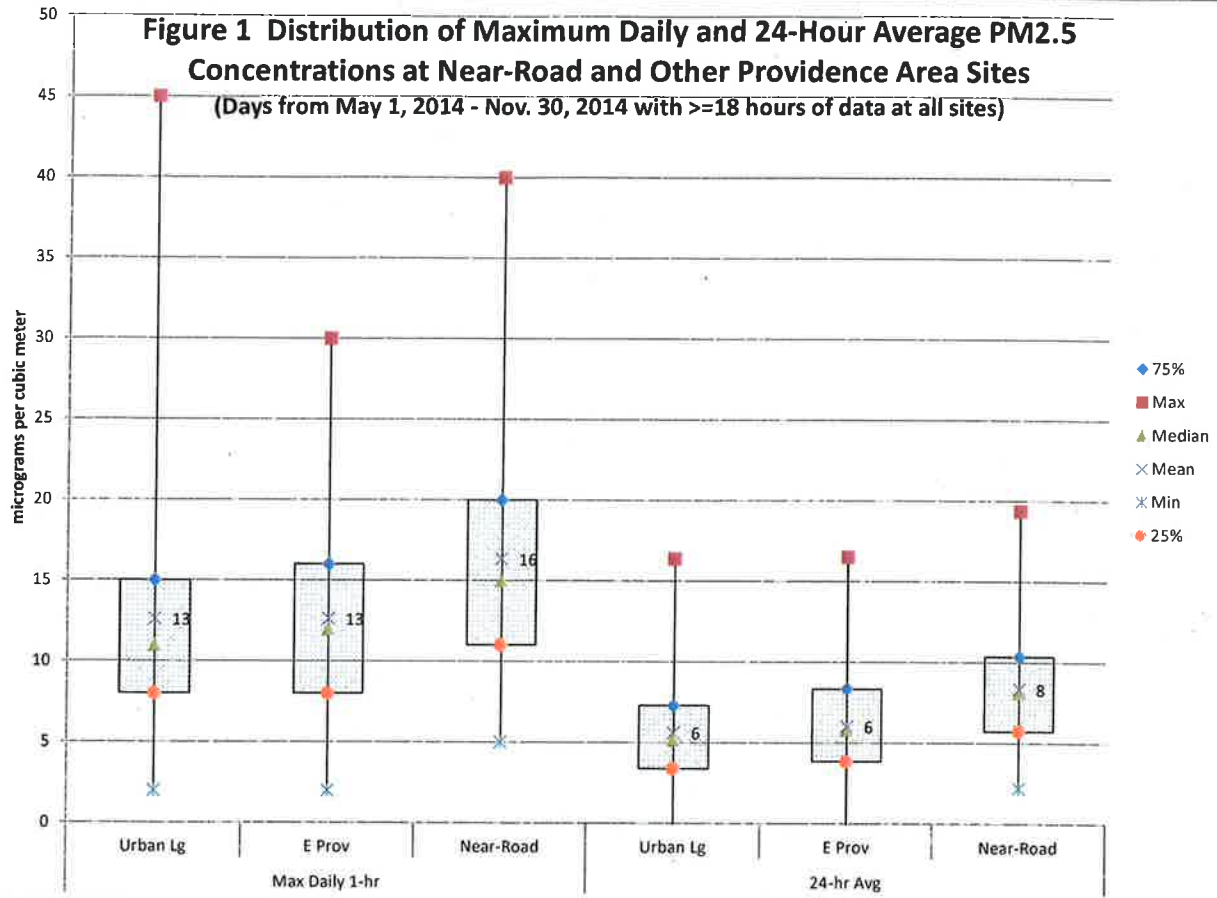
<sup>2</sup> Asthma Claims Categories (% Children Ages 2-17 with Asthma Claim) Category 1 – 10.4- 15.4%. Category 2 – 8-10.3%, Category 3- 6.3-7.9%, Category 4 – 4.5-6.2%, Category 5 – 0-4.4%. From Rhode Island Department of Health and Providence Plan, Asthma Claims Data Book 2014.

<http://www.health.ri.gov/publications/databooks/2014AsthmaClaims.pdf>

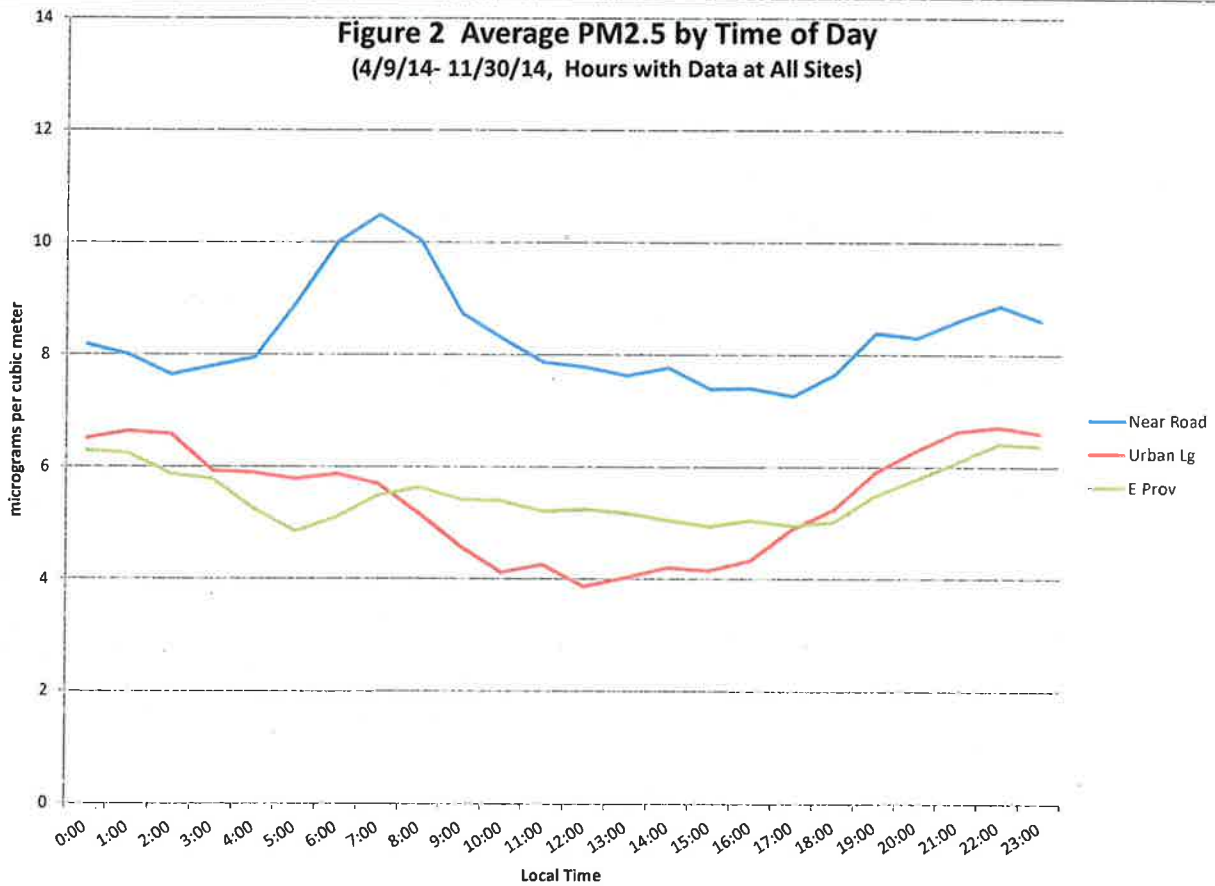
<sup>3</sup> % Poverty, %African American and %Hispanic from ACS 2009 estimates.

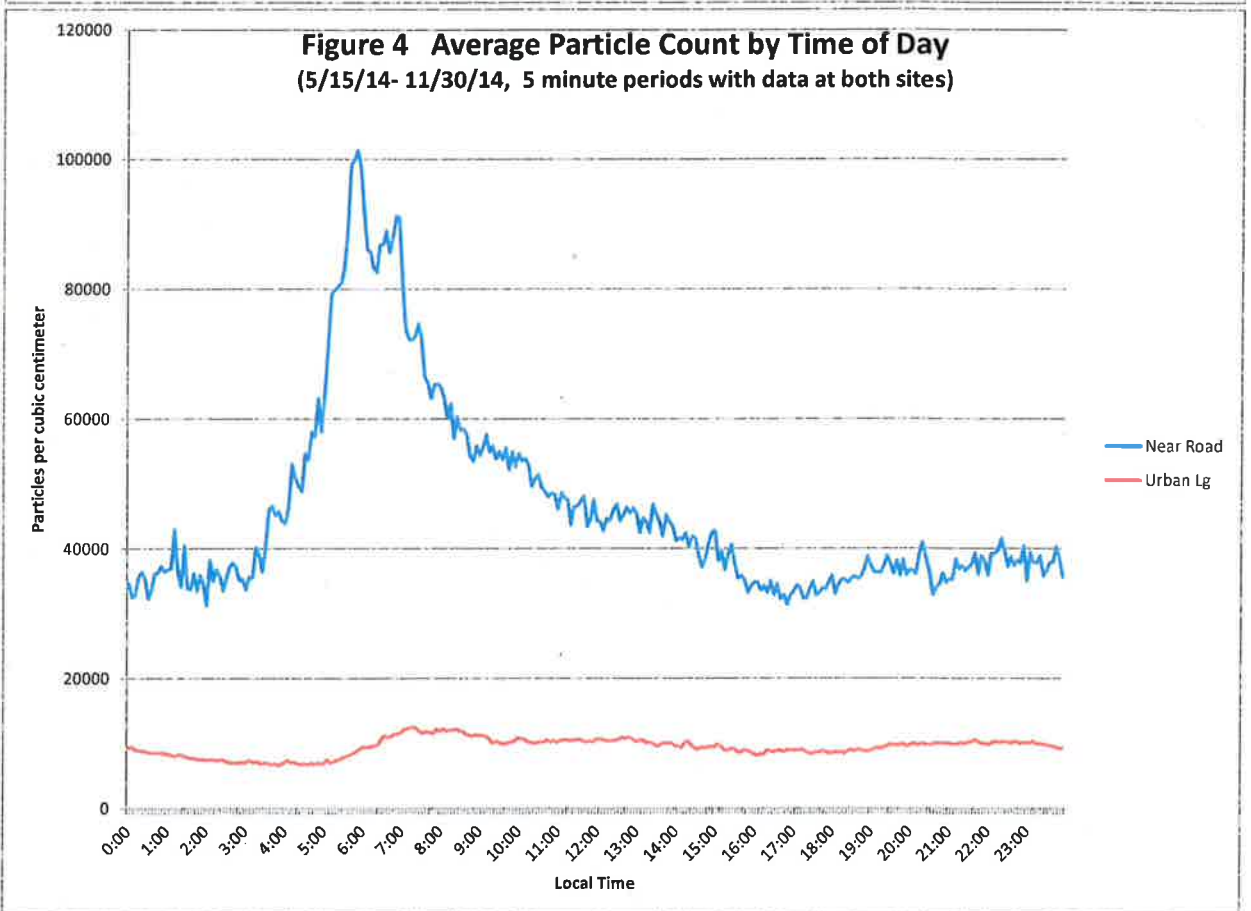
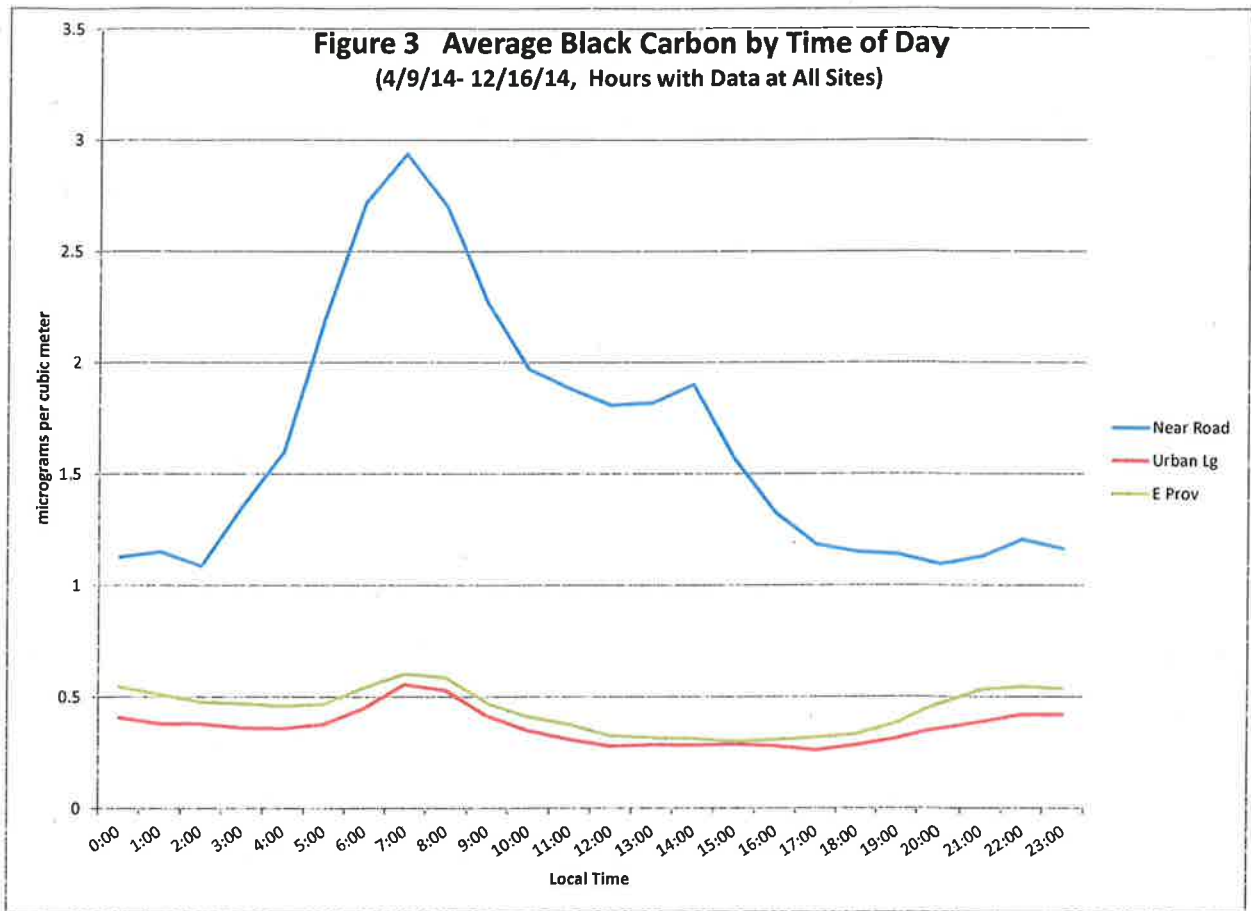
[http://proximityone.com/ustr0509\\_ri.htm](http://proximityone.com/ustr0509_ri.htm)

**Figure 1 Distribution of Maximum Daily and 24-Hour Average PM2.5 Concentrations at Near-Road and Other Providence Area Sites**  
 (Days from May 1, 2014 - Nov. 30, 2014 with >=18 hours of data at all sites)



**Figure 2 Average PM2.5 by Time of Day**  
 (4/9/14- 11/30/14, Hours with Data at All Sites)





**Figure 5 2013 Mobile Source VOC Concentrations at Rhode Island Sites**

(Alton Jones (AJ) - rural; E Providence (EP) - suburban downwind;  
Urban Lg, Prov (UL) - urban; Vernon St, Pawtucket (VE)- adjacent to I-95)

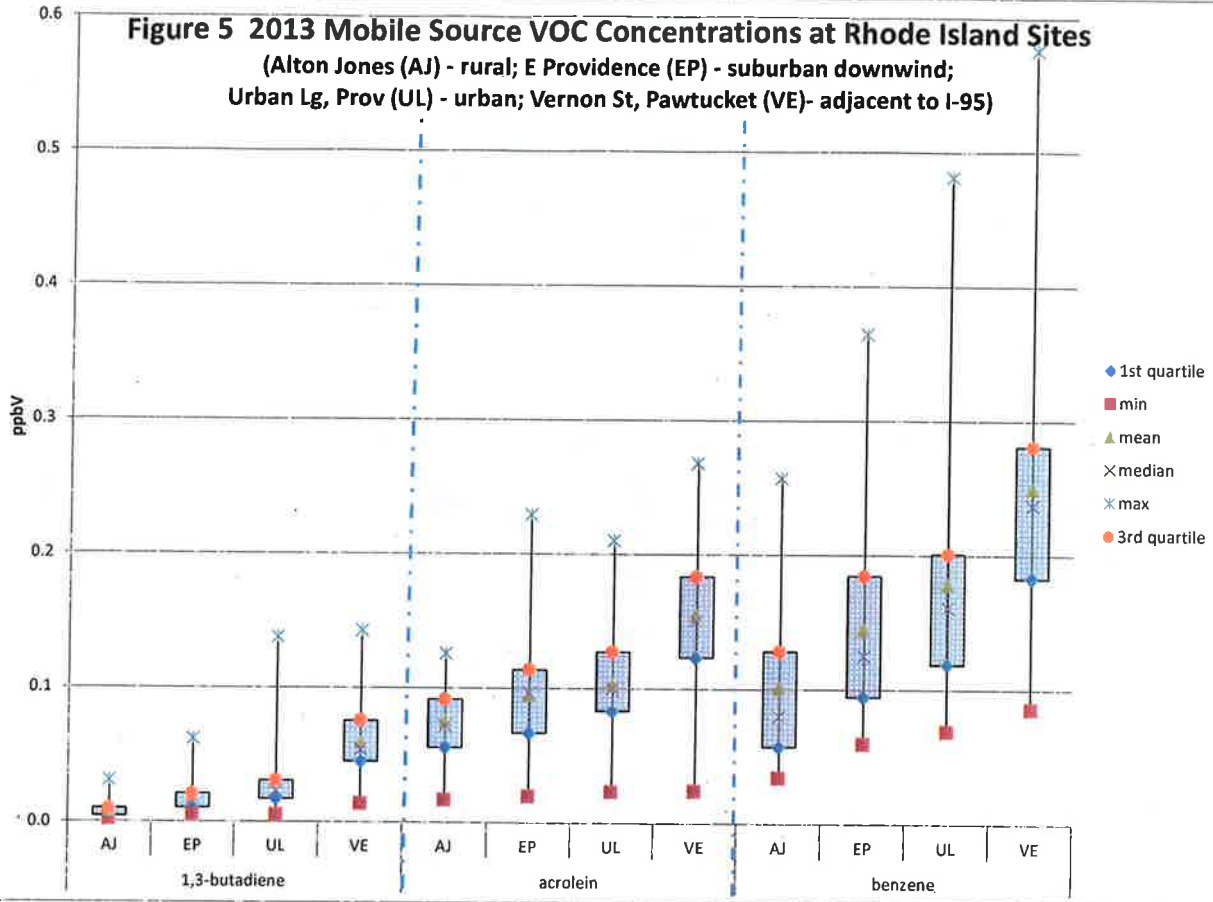
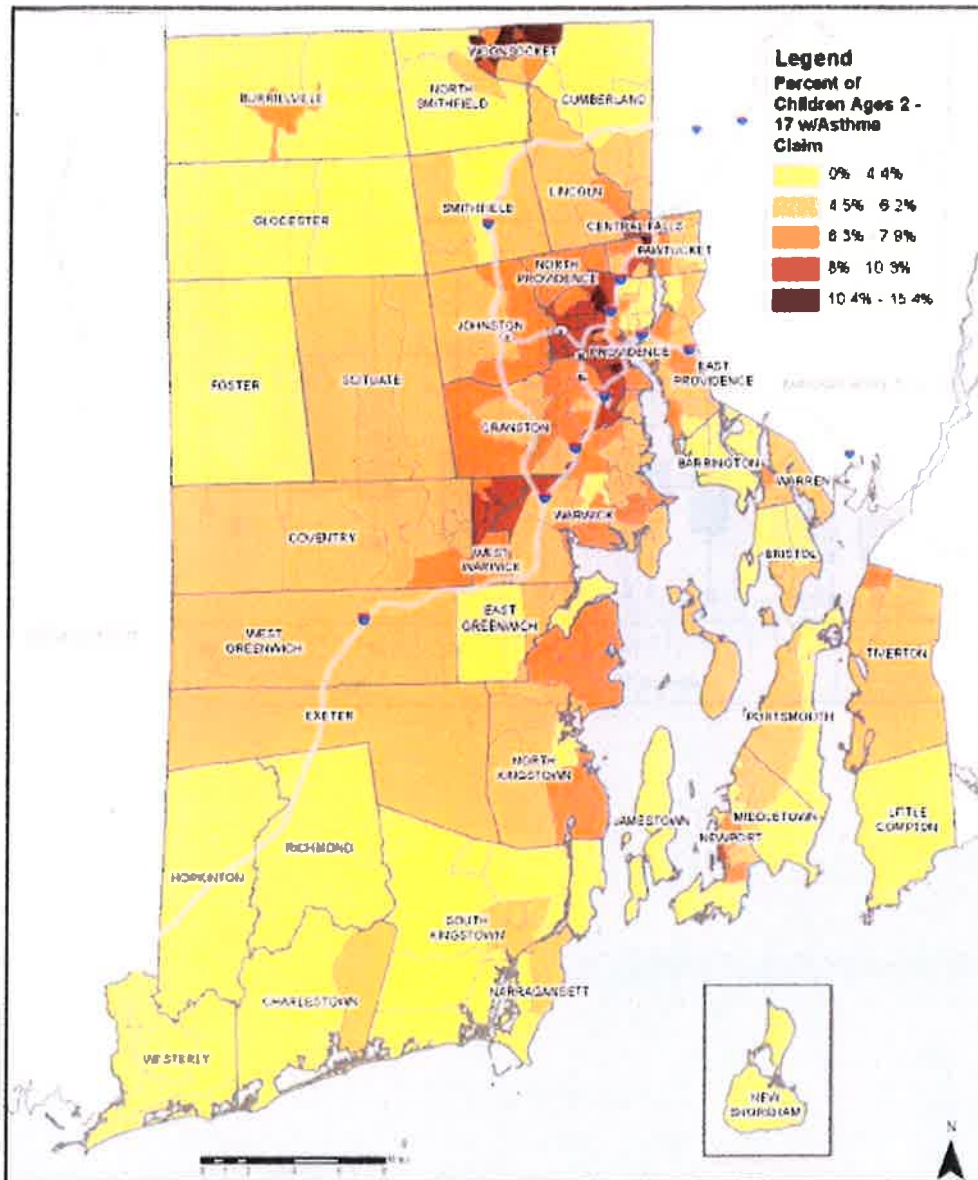




Figure 6<sup>4</sup>

Percent of Children Ages 2-17 with an Asthma Claim\*, 2010-2012,  
Three-Year Average



\* Asthma diagnosis in diagnosis fields 1-6 (UHC) or 1-4 (BCBSRI and MHPRI) on any claims form. ICD-9-CM 493.1x

Rhode Island State Plane Feet, NAD83  
 Data Sources: Census 2010, American Community Survey 5 year (2007-2011)  
 Rhode Island Geographic Information System (RIGIS),  
 Neighborhood Health Plan of Rhode Island, United Healthcare of New England  
 Blue Cross & Blue Shield of Rhode Island, Rhode Island Department of Health

Map Produced by: The Providence Plan  
 For: Rhode Island Department of Health

<sup>4</sup> From Rhode Island Department of Health and Providence Plan, *Asthma Claims Data Book 2014*.  
<http://www.health.ri.gov/publications/databooks/2014AsthmaClaims.pdf>



**Figure 7 Carbonyl Data from Pilot Study**  
(May 2001 - May 2002)

