

Rhode Island Air Toxics Monitoring Project

Presented to Air Toxics Monitoring
Workshop

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RI Sites

- 5 sites
 - E. Providence PAMS/PM2.5 site
 - Urban League PM2.5 site - urban residential
 - Pawtucket PM2.5/PM10 site - adjacent to I-95
 - Johnson & Wales University - residential & industrial area
 - West End - urban school/residential/industrial area

9 Core VOCs

Benzene

1,3-Butadiene

Carbon tetrachloride

Chloroform

1,2-Dichloropropane

Dichloromethane

Tetrachloroethylene

Trichloroethylene

Vinyl chloride

7 “Max” VOCs

- Acrylonitrile
- 1,2-Dibromoethane
- cis-1,3-Dichloropropene
- trans-1,3-Dichloropropene
- 1,2-Dichloroethane
- Ethylene oxide
- 1,1,2,2-Tetrachloroethane

16 Other VOC HAPs

Chloromethane

Carbon disulfide

Chlorobenzene

p-Dichlorobenzene

Ethylbenzene

1,1-Dichloroethane

1,1-Dichloroethene

n-Hexane

1,1,1-Trichloroethane

MTBE

MEK

Styrene

Toluene

2,2,4-Trimethylpentane

Xylenes (o, m&p)

Core Metals and Carbonyls

Metals (total)

Beryllium

Cadmium

Chromium

Lead

Manganese

Nickel

Carbonyls

Formaldehyde

Acetaldehyde

(Acetone)

Network Operation

- Began sampling May 19, 2001
- Start-up issues - electricity, training
- 24-hour samples every 6th day
 - All pollutants
 - All sites
- Good/Excellent data capture

Diurnal Variation

- E. Providence PAMS/Toxics site
- No continuous VOC monitors
- June, July and August - 8 3-hour VOC samples collected per day
- October, January and May - 2 12-hour VOC samples collected per day
- 6:00 AM - 6:00 PM, 6:00 PM - 6:00 AM

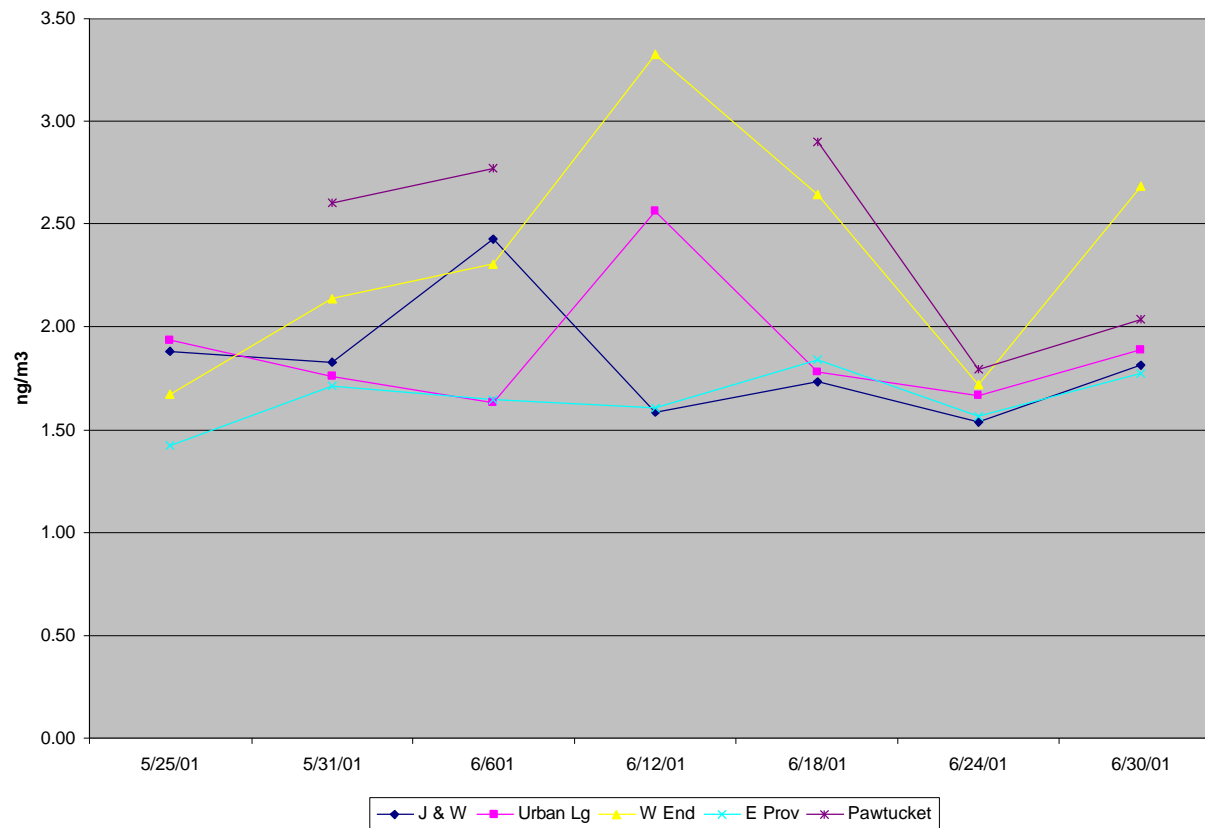
Preliminary Data Availability

- VOCs
 - 21 sampling days 5/19 - 9/16
- Carbonyls
 - 25 sampling days 5/19 - 10/10
- Metals
 - 8 sampling days 5/18 - 6/30
 - Contract lab

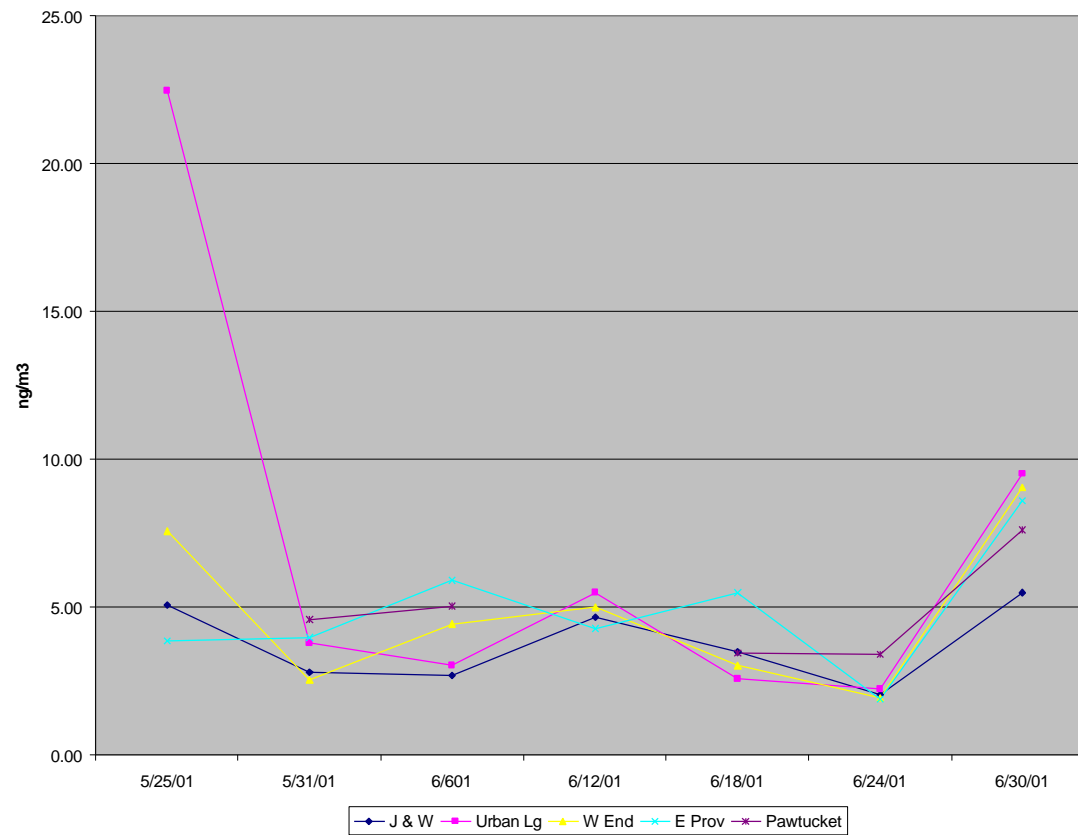
Metals Levels (Avg. 5/25-6/30)

	Be	Cr	Mn	Ni	Cd	Pb	PM
	ng/m3	ng/m3	ng/m3	ng/m3	ng/m3	ng/m3	ug/m3
Cancer BM	0.4	0.08 (VI)		4	0.6	80	
Noncancer BM	20	8 (VI mists)	50	6000 (ac)	200		
E Prov TSP	0.007	2.0	8.3	5.0	0.1	6.4	40
E Prov PM10	0.003	1.7	4.7	4.9	0.1	4.5	25
Urban Lg TSP	0.009	2.5	8.7	8.2	0.2	17.5	40
Urban Lg	0.003	1.9	3.7	7.0	0.1	9.8	24
J & W	0.003	1.8	3.7	3.7	0.2	4.6	23
Pawtucket	0.004	2.3	6.1	4.9	0.2	5.4	24
West End	0.007	2.4	6.2	4.8	0.2	9.4	28

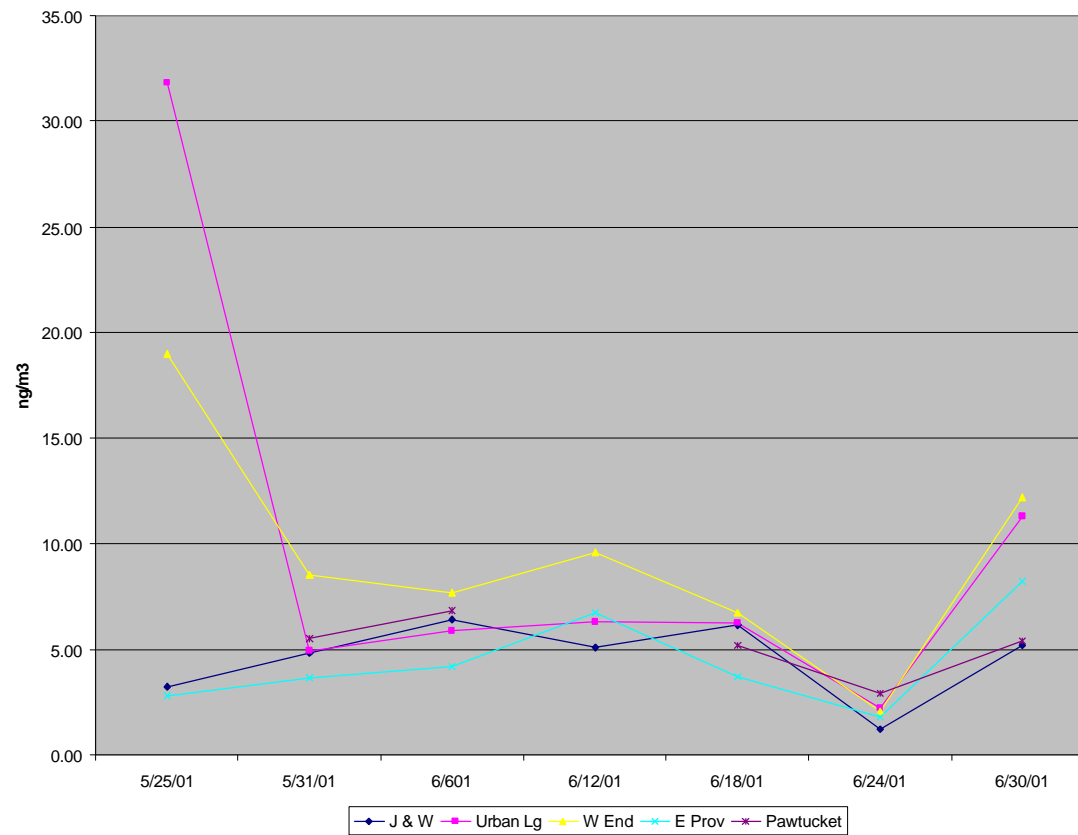
Chromium in PM10 Samples



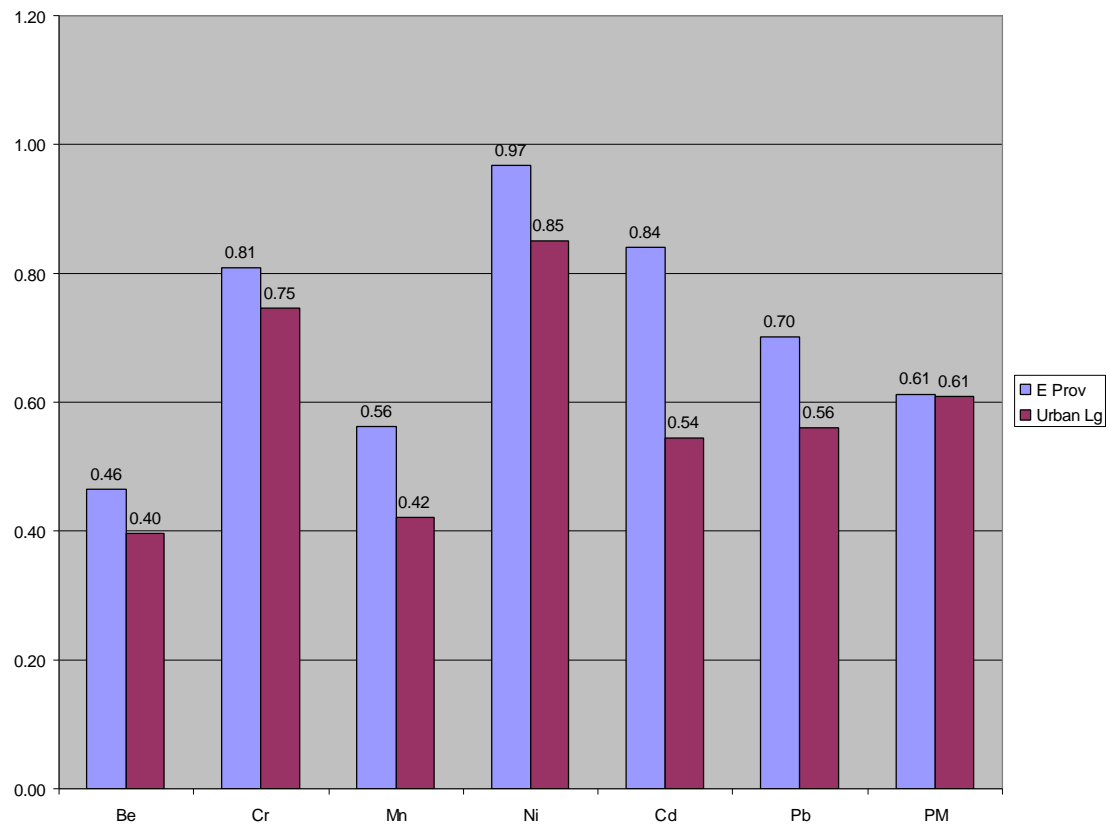
Nickel in PM10 Samples



Lead in PM10 Samples



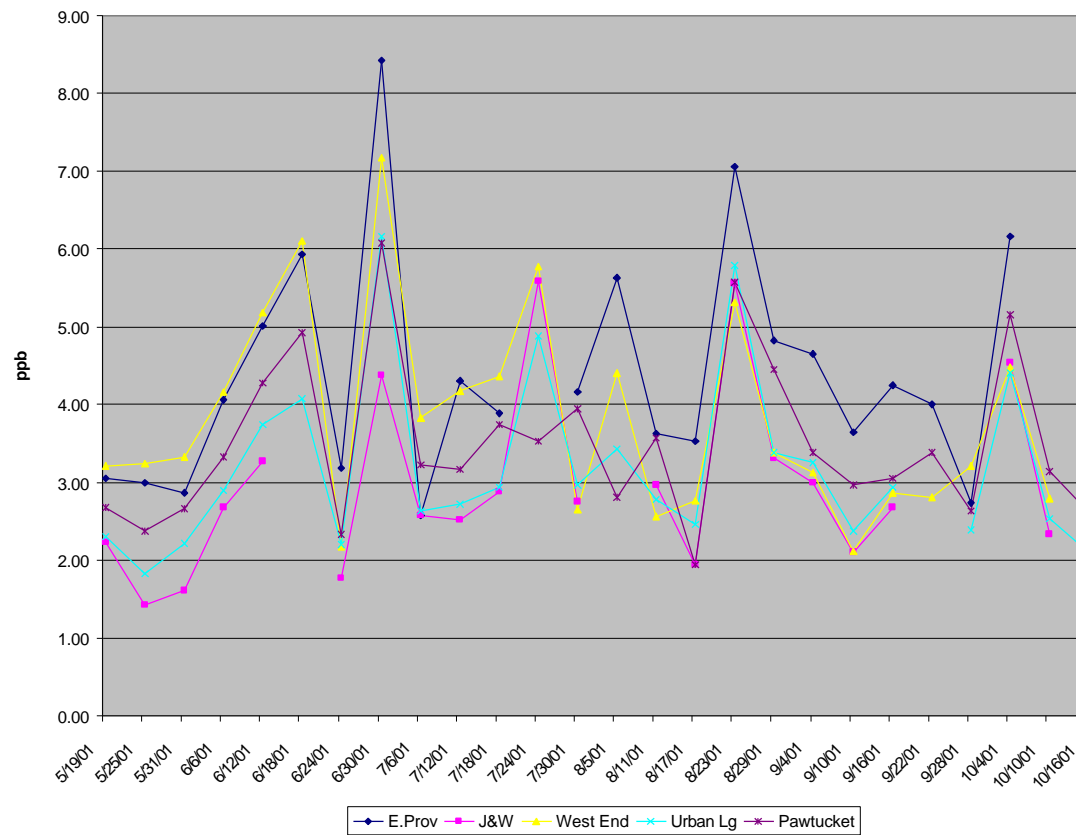
PM10 Metals/TSP Metals at Collocated Sites



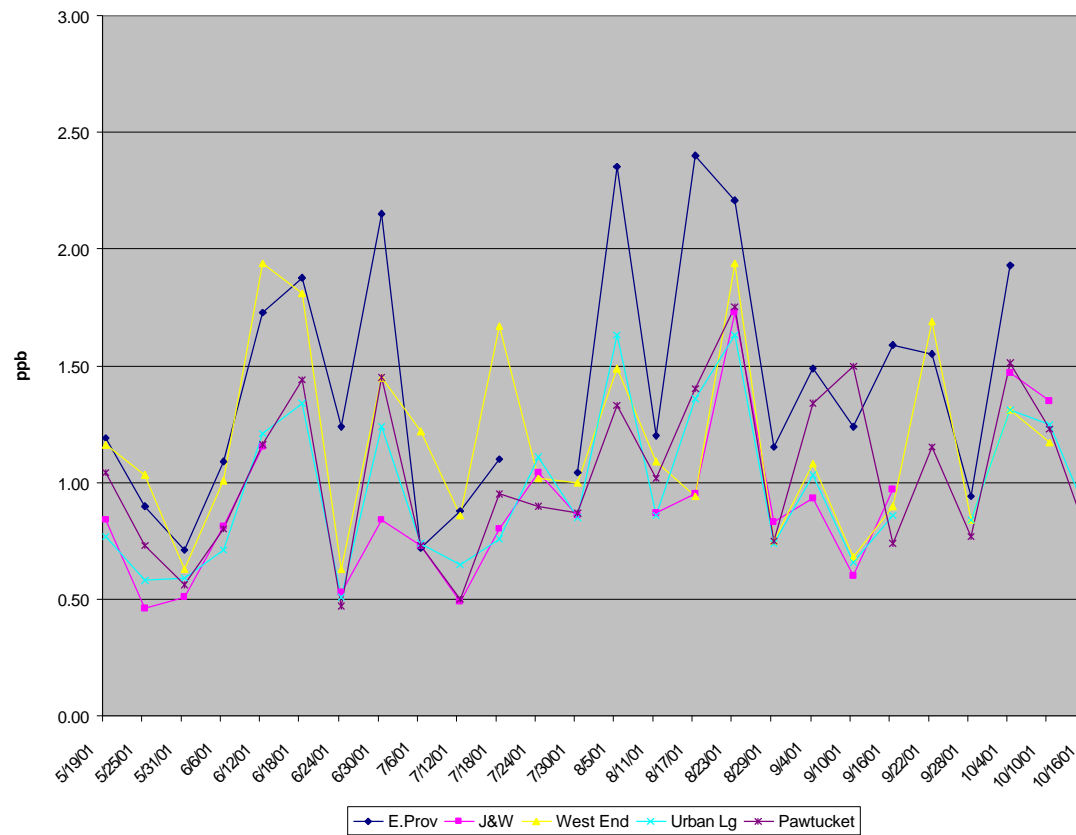
Carbonyls at RI Sites (5/19 - 9/4)

	Formaldehyde	Acetaldehyde	Acetone
Cancer BM	0.07	0.3	
NonCancer BM	30	5	10,000
<u>Average</u>			
E Prov	4.3	1.4	2.5
W End	3.7	1.1	2.0
Pawtucket	3.6	1.0	1.9
Urban Lg	3.2	0.9	2.0
J & W	2.9	0.9	1.8
<u>Maximum</u>			
E Prov	8.4	2.4	4.2
W End	5.6	1.7	3.6
Pawtucket	7.2	1.9	3.8
Urban Lg	6.2	1.6	3.8
J & W	6.1	1.8	3.2

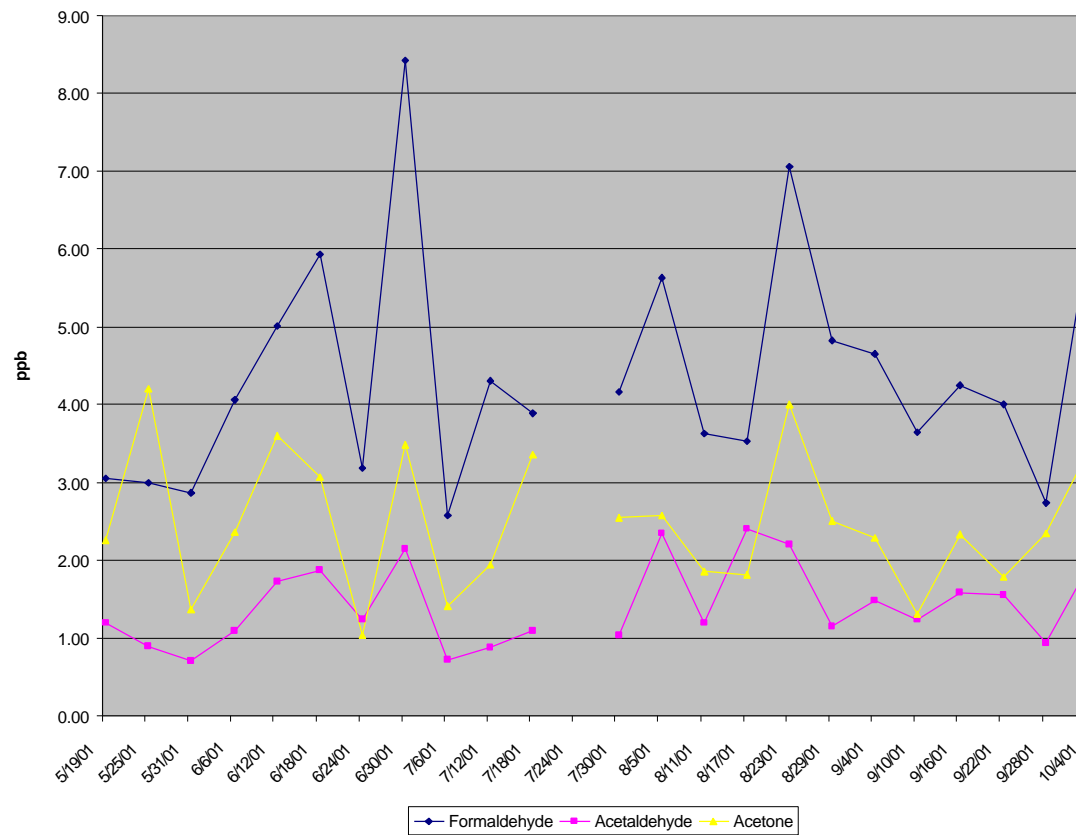
Formaldehyde at RI Sites



Acetaldehyde at RI Sites



Carbonyls at E. Providence Site



Highest Risk VOCs

VOC	Risk Range	Highest Sites
Ethylene oxide	2 – 4 E-5	J&W, Urb Lg
1,3-Butadiene	3 E-6 – 3 E-5	Pawtucket
Benzene	2 E-6 – 1 E-5	Pawtucket
Carbon tet	9 E-6	All
Chloroform	2 – 4 E-6	All

Highest Risk VOCs (cont.)

VOC	Risk Range	Highest Sites
Perchloroethylene	4 E-7 – 3 E-6	J&W
Acrylonitrile	ND – 2 E-6	E Pr, Urb Lg
Trichloroethylene	3 E-8 – 1 E-6	W End, J&W
Ethylene dibromide	ND – 1 E-6	E Prov
Methylene chloride	2 –7 E-7	J&W

16 VOCs Higher at AT Sites than at Background Site

1,3-Butadiene

Methyl-t-butyl-ether

n-Hexane

Ethylbenzene

Ethylene oxide

Dichloromethane

Perchloroethylene

p-Dichlorobenzene

Carbon disulfide

Methyl ethyl ketone

Benzene

Xylenes

Toluene

Trichloroethylene

Styrene

Acrylonitrile

8 VOCs Higher at Urban/Mobile Sites than at E Prov PAMS Site

Benzene - Pawtucket

1,3-Butadiene - Pawtucket

Ethylbenzene - Pawtucket, J&W

Xylenes - J&W, Pawtucket

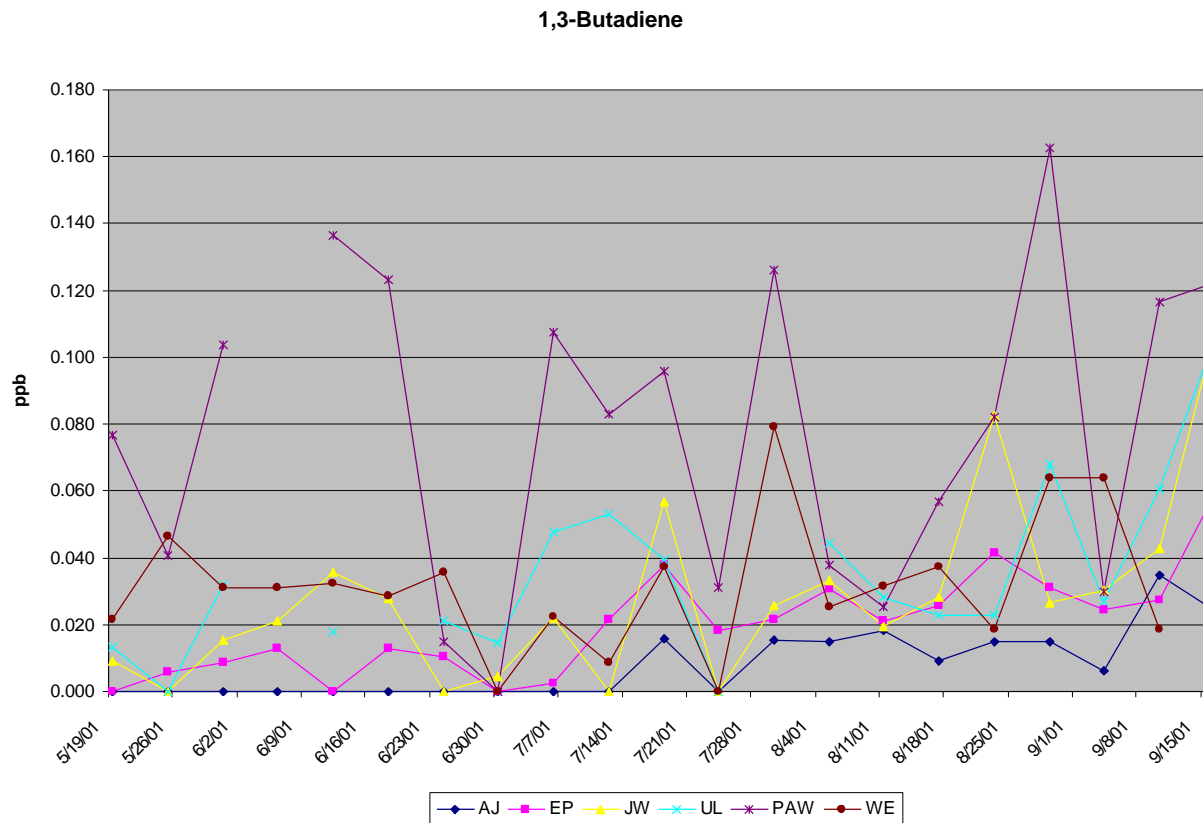
Methylene chloride - J&W

Trichloroethylene - All Sites

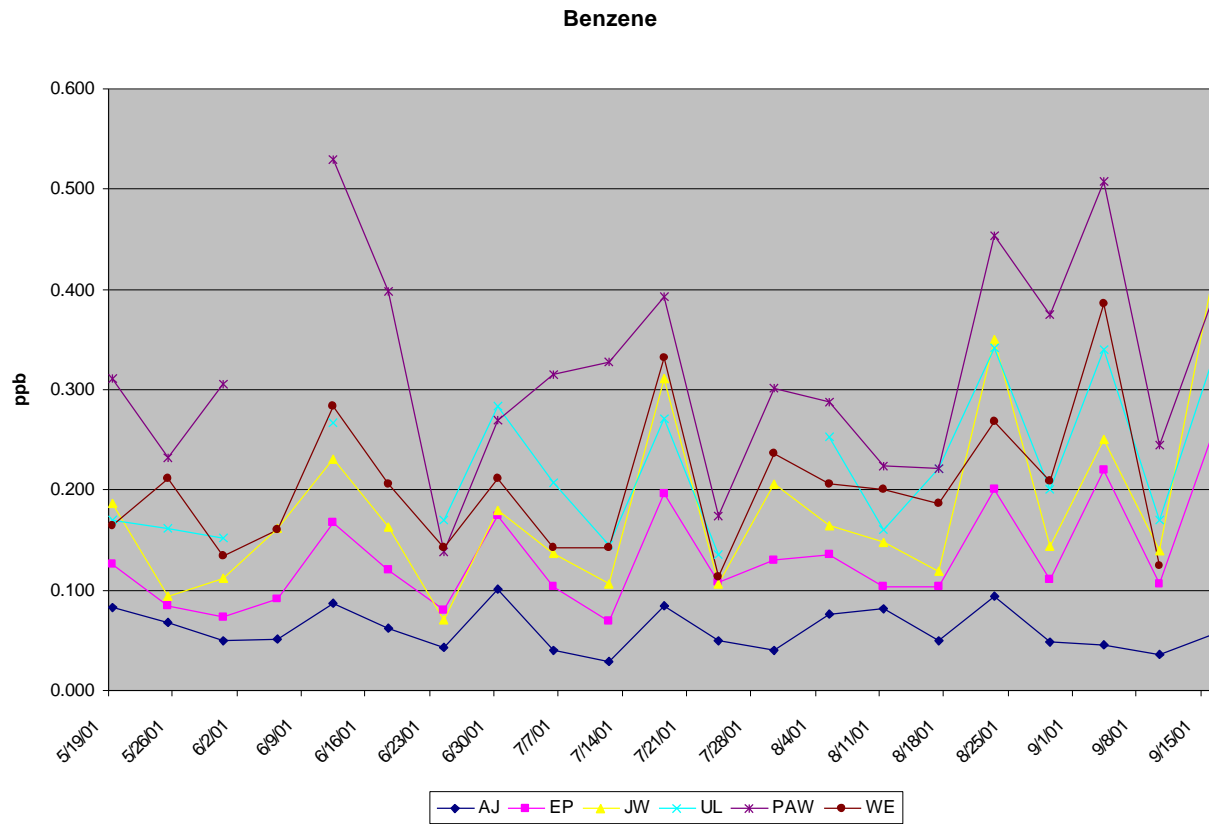
Perchloroethylene - J&W

Styrene - Pawtucket, W End, J&W

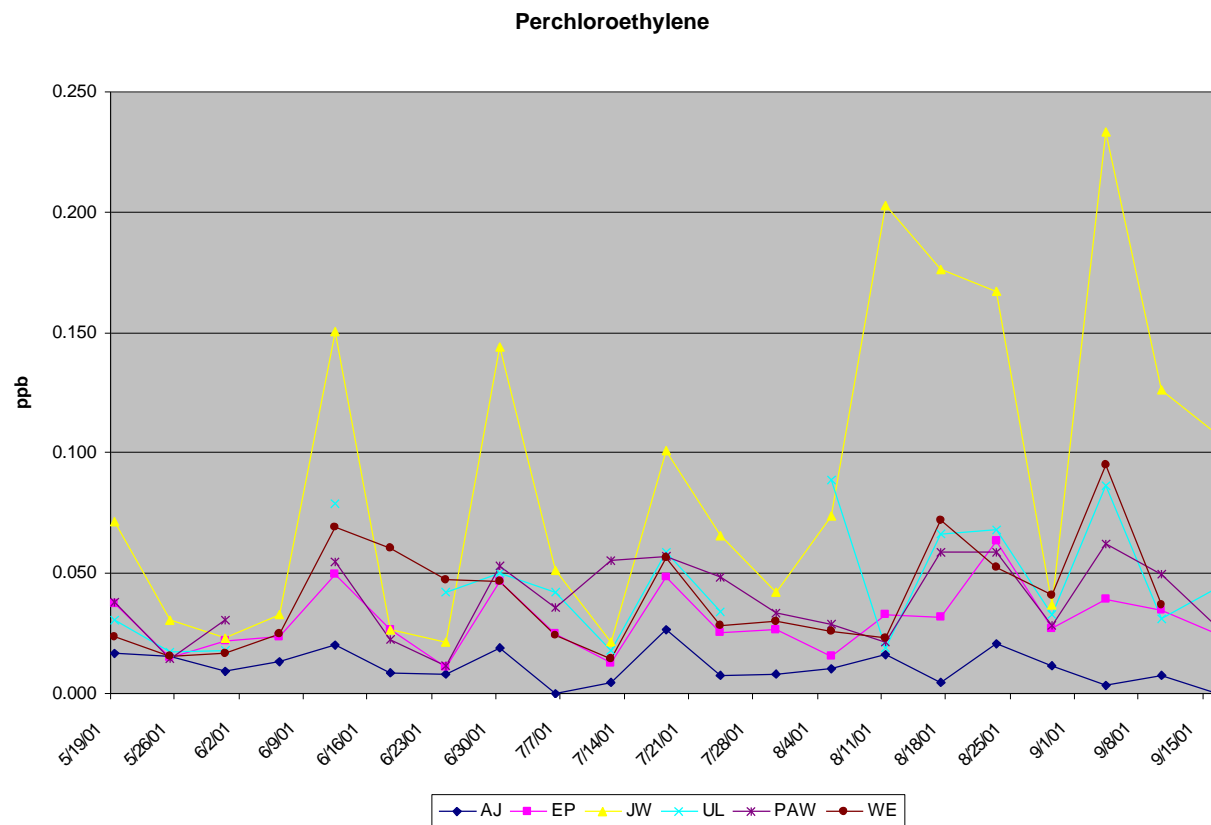
1,3-Butadiene



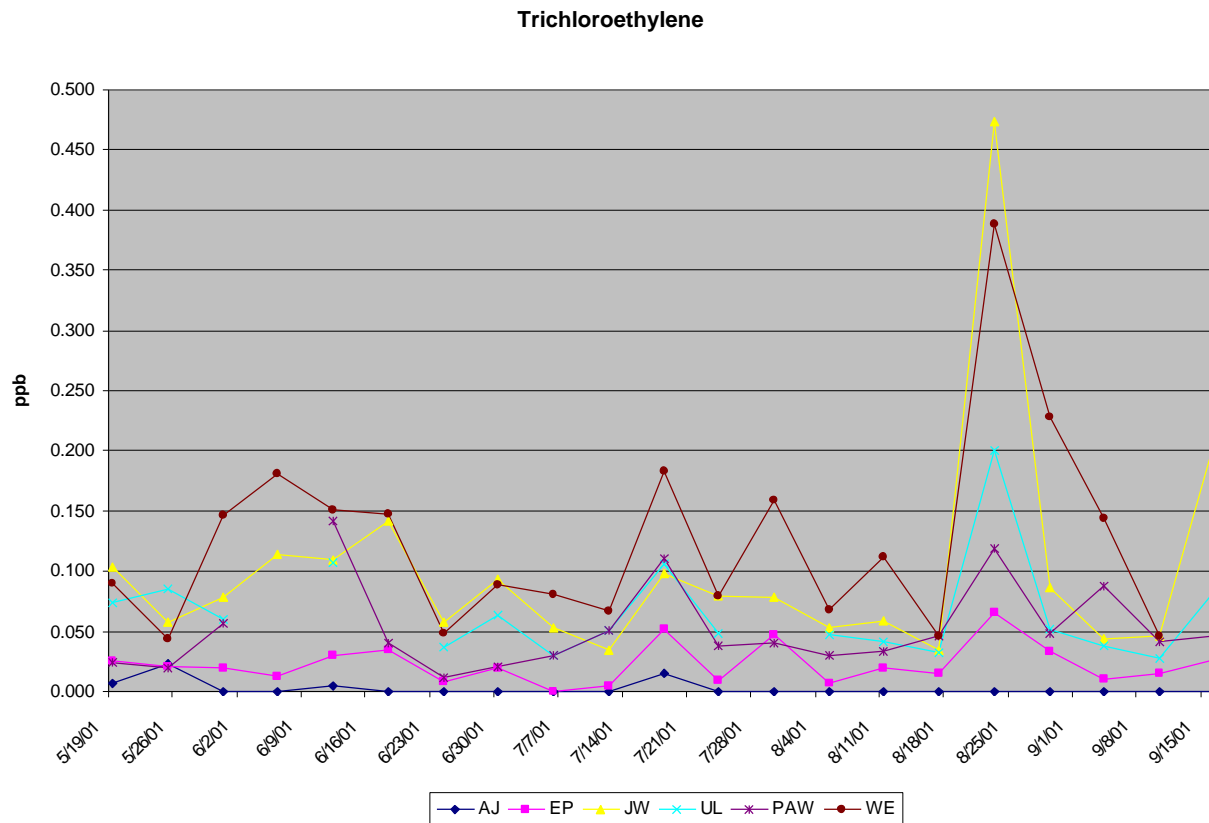
Benzene



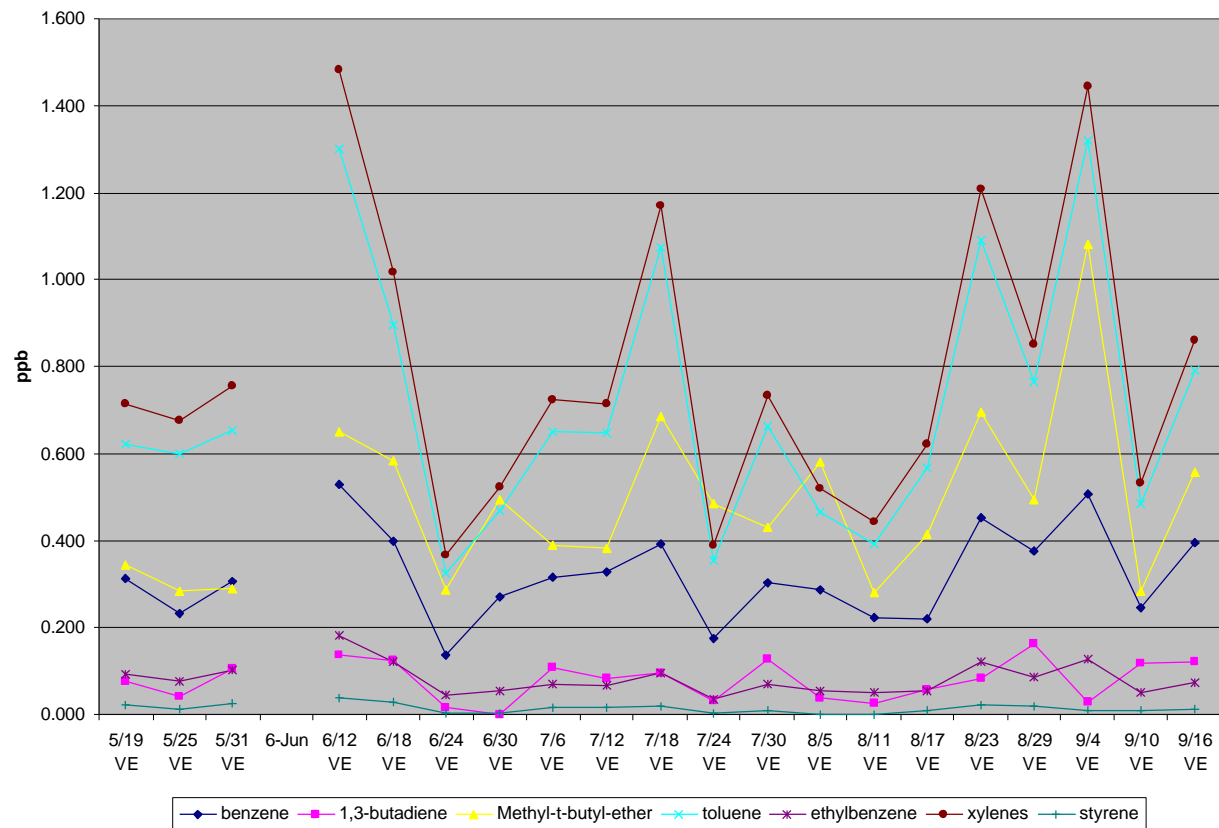
Perchloroethylene



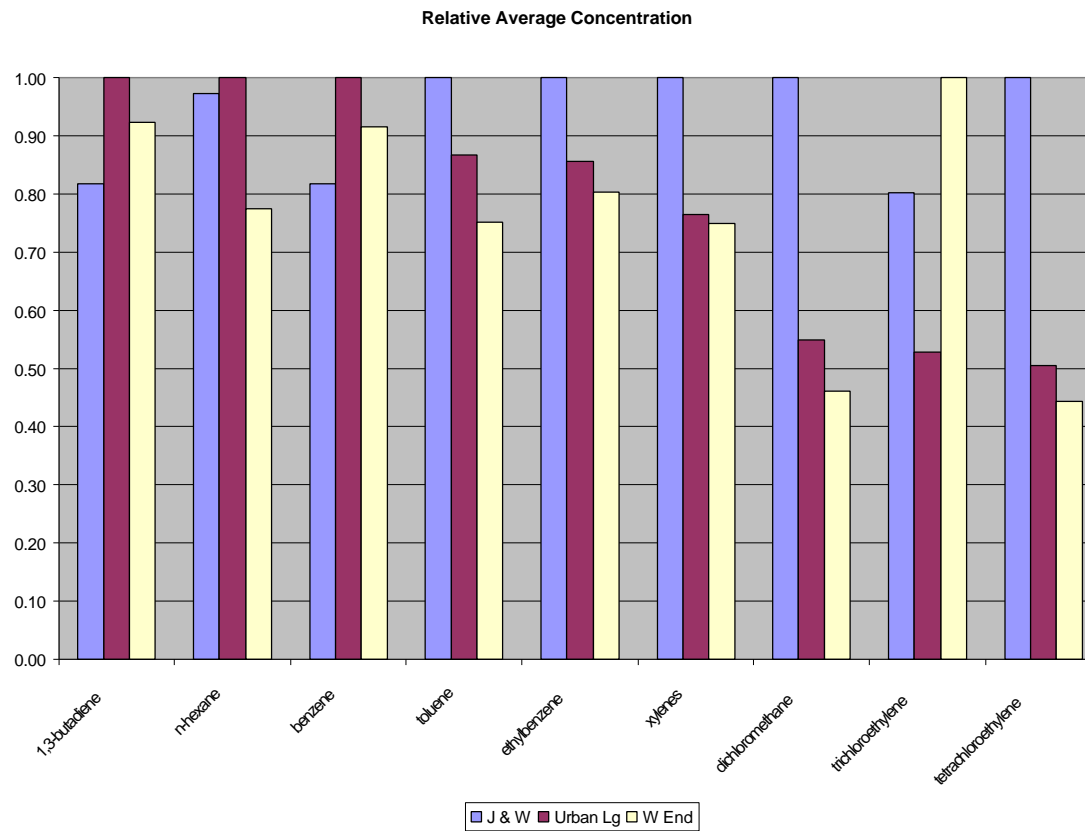
Trichloroethylene



Motor Vehicle Pollutants at Pawtucket Site



Spatial Variability - Providence Sites



Further Analysis

- QA/QC - Duplicates
- Further analysis of PM10 vs TSP
- Correlate daily concentrations with met data
 - Identify conditions that produce high levels
 - Identify relevant emissions sources
- Track seasonal variation
- Track diurnal variation

Further Analysis (cont.)

- Investigate whether shorter averaging time important from health standpoint
- Compare 1/6 day versus 1/12 day averages, peaks
- Determine whether 1 site in Providence is sufficient
- Identify best site for continued monitoring in 2002