VT & CT FDMS Experiences

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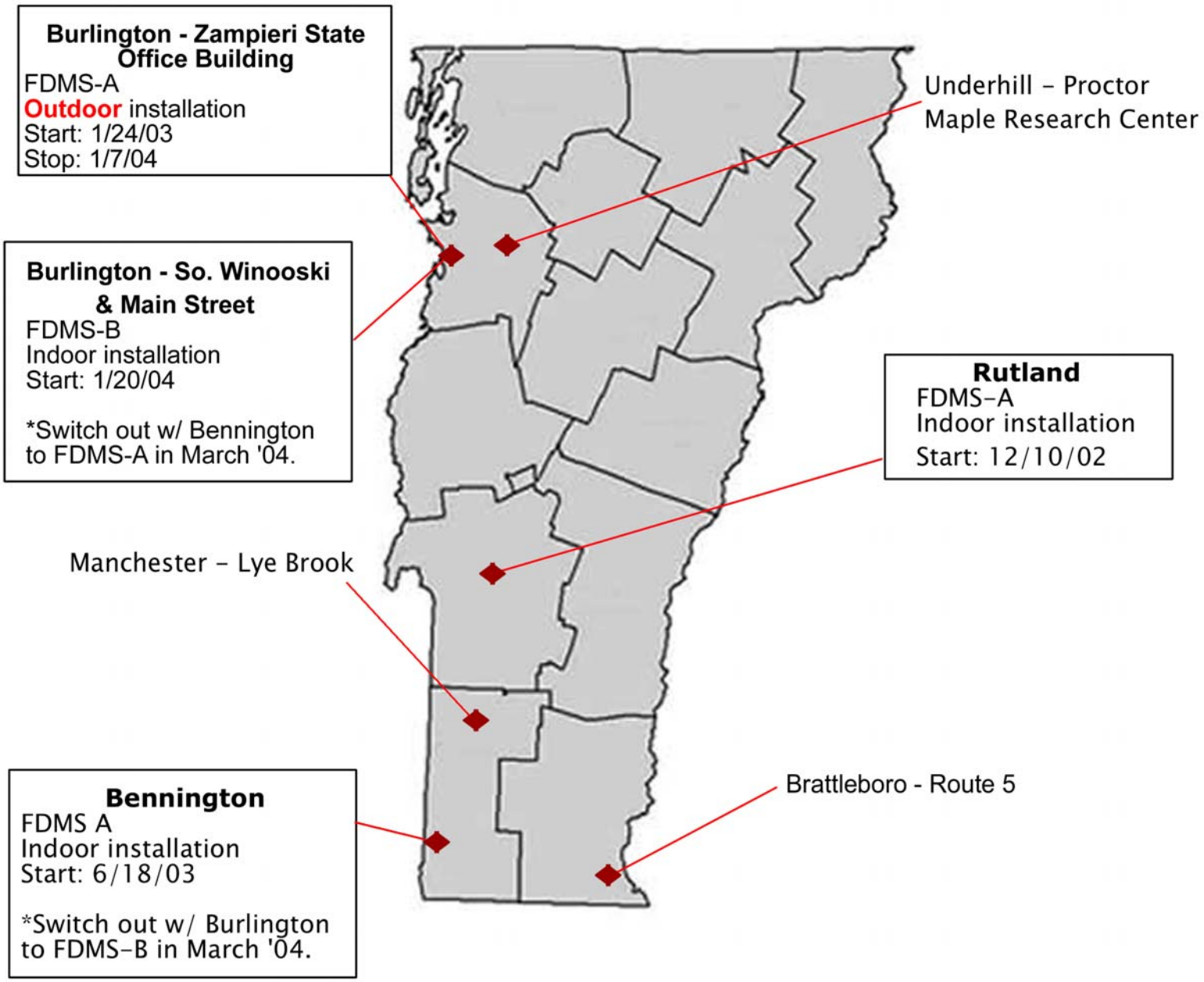
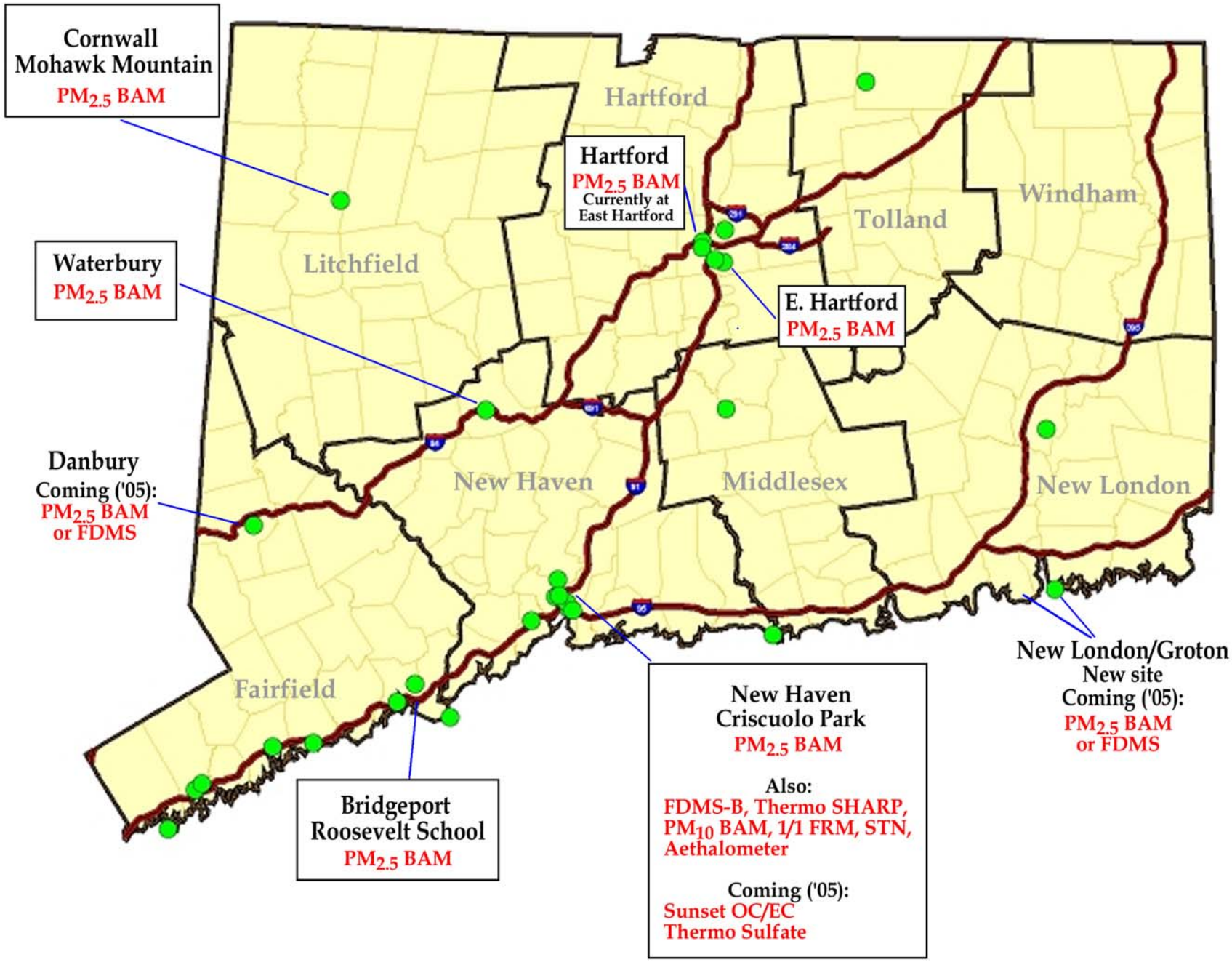
VT FDMS Network



CT BAM Network



Proposed $PM_{2.5}$ National Equivalency Criteria

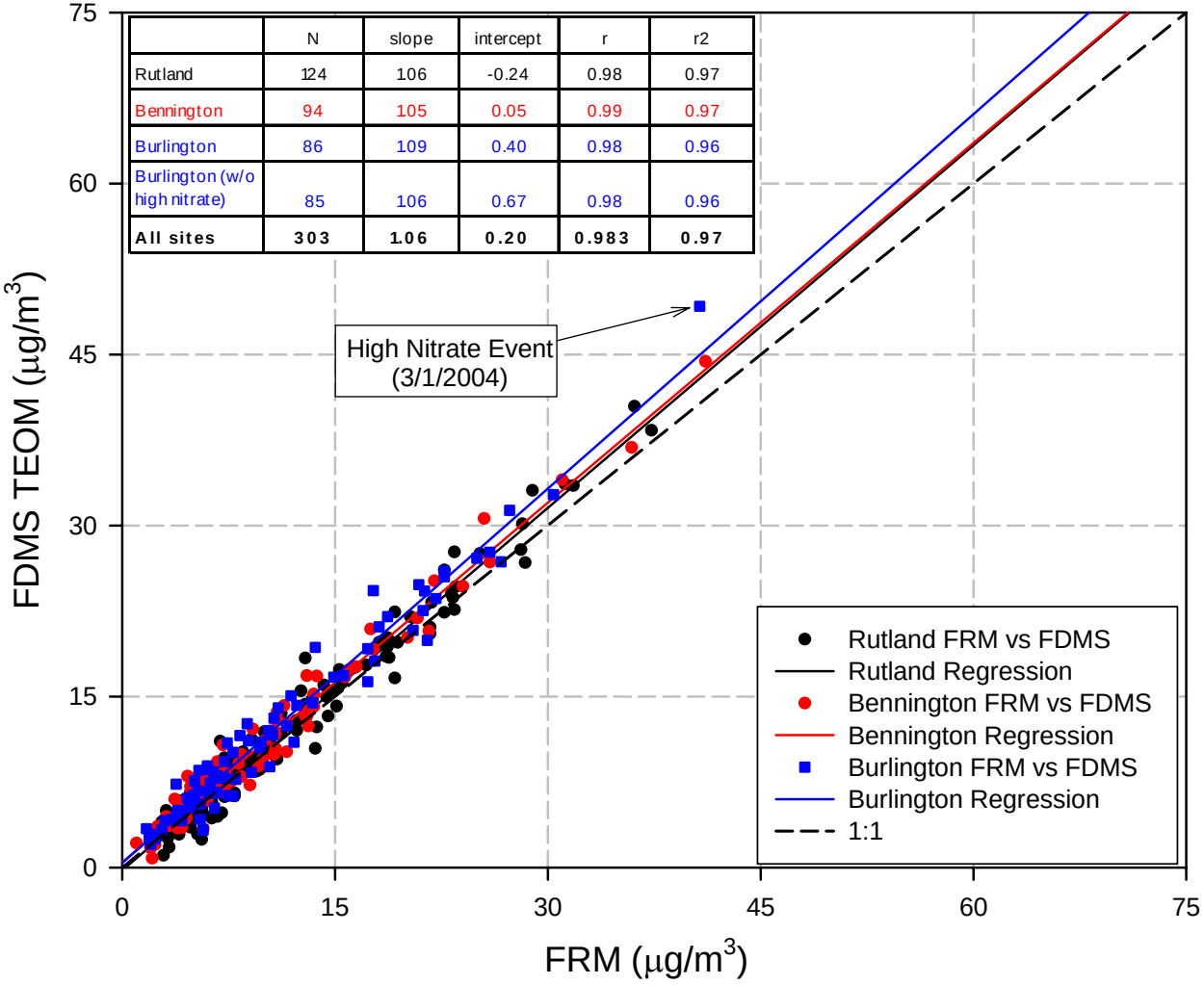
Workgroup Draft of $PM_{2.5}$ National Equivalency Criteria

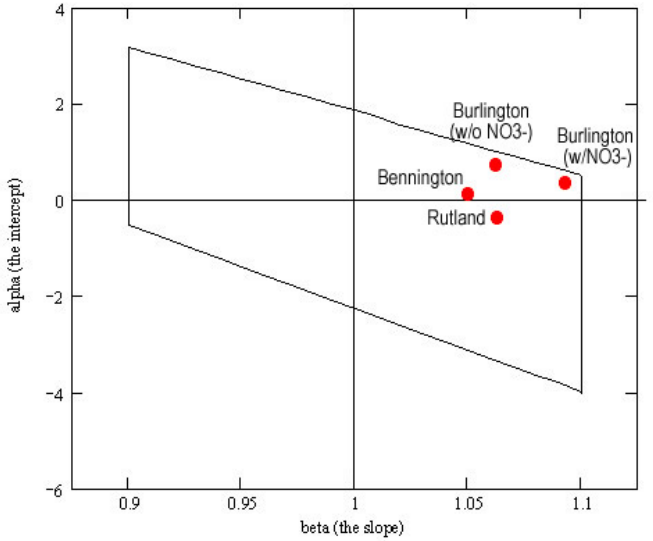
For illustrative purposes only, do not cite or quote

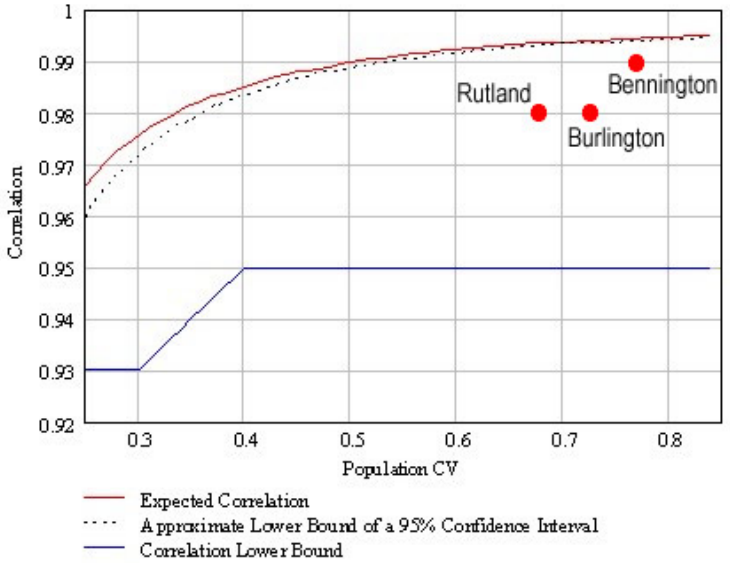
Vermont FRM vs FDMS TEOM 24hr $PM_{2.5}$ Averages

3 sites; December 2002 through June 2004

	N	slope	intercept	r	r2
Rutland	124	1.06	-0.24	0.98	0.97
Bennington	94	1.05	0.05	0.99	0.97
Burlington	86	1.09	0.40	0.98	0.96
Burlington (w/o high nitrate)	85	1.06	0.67	0.98	0.96
All sites	**303**	**1.06**	**0.20**	**0.983**	**0.97**







Proposed $PM_{2.5}$ National Equivalency Criteria

Workgroup Draft of $PM_{2.5}$ National Equivalency Criteria

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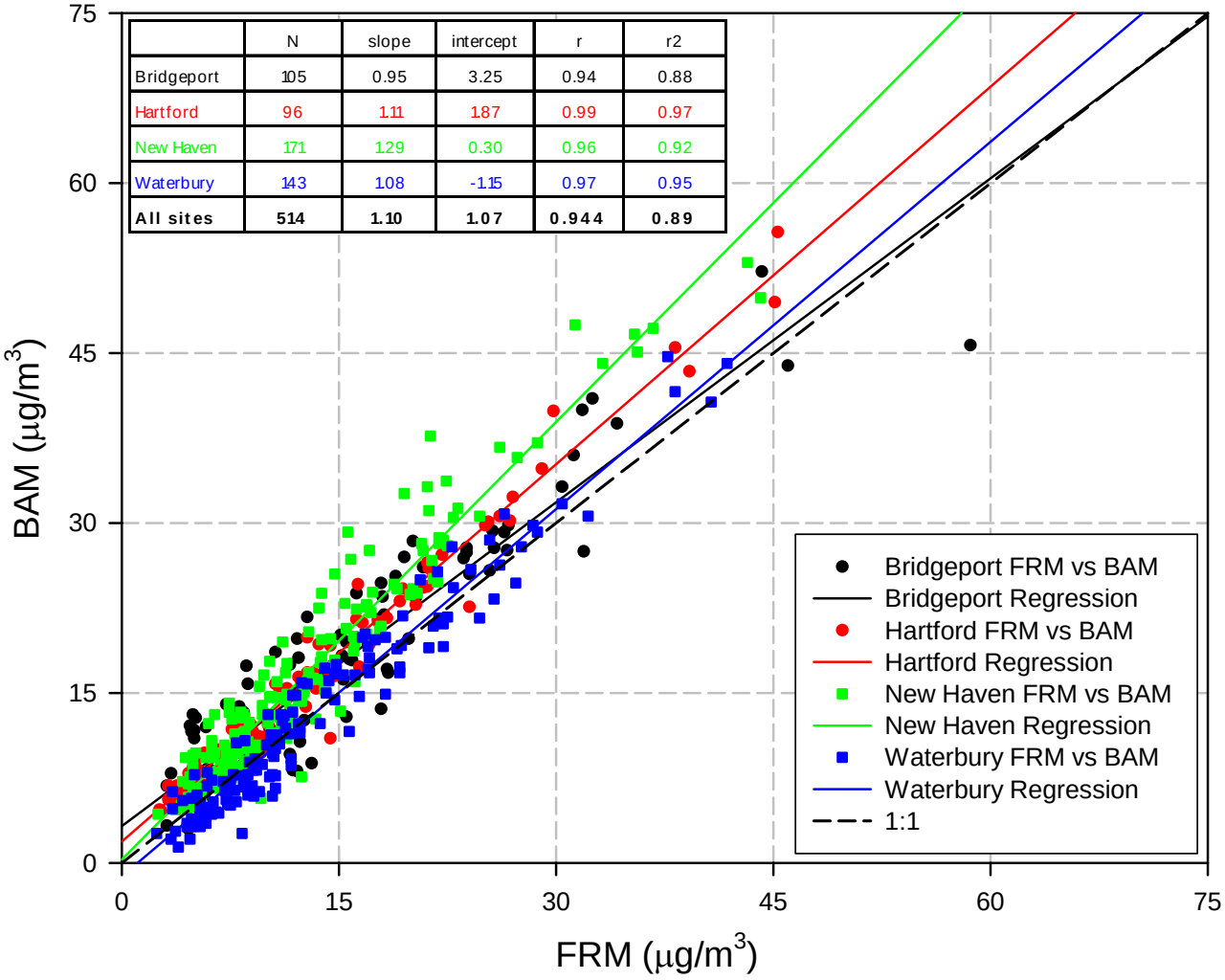
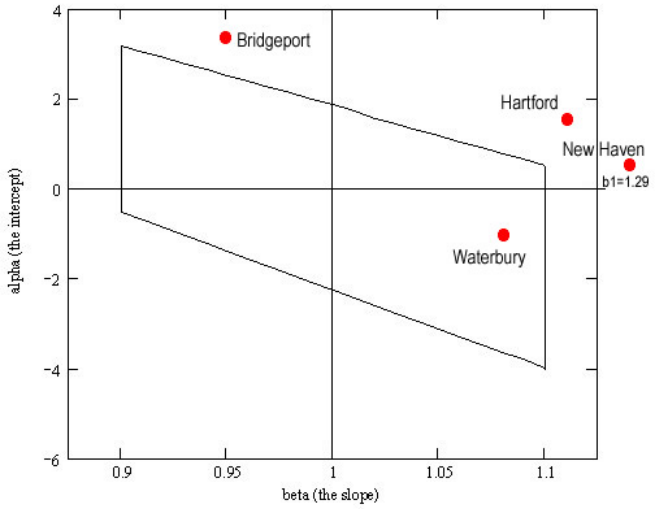
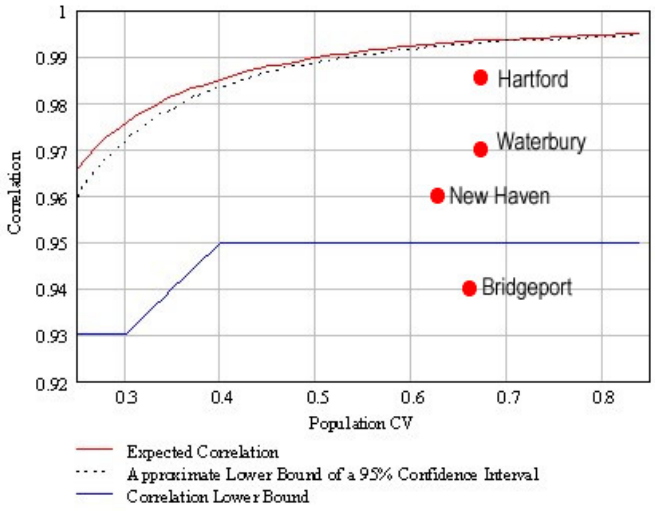
Connecticut FRM vs BAM 24hr $PM_{2.5}$ Averages

4 sites; June 2003 through September 2004

	N	slope	intercept	r	r2
Bridgeport	105	0.95	3.25	0.94	0.88
Hartford	96	1.11	1.87	0.99	0.97
New Haven	171	1.29	0.30	0.96	0.92
Waterbury	143	1.08	-1.15	0.97	0.95
All sites	**514**	**1.10**	**1.07**	**0.944**	**0.89**







FDMS Routine Maintenance

Weekly:

- Site
  - Check "Status" and "Filter %"
- ESC/Data Acquisition
  - Check "Total PM," "Non-Volatile PM" and "Volatile PM"
    - Usually best way is to graph all sites at once
- RPComm
  - If any issues observed above, call remotely and download data/troubleshoot.
- Other
  - Also keep an eye on shelter temp (whether indoor or outdoor installation).

Monthly:

- Site
  - Change both filters – Sensor unit and FDMS
  - Do flow audit before and after filter change, partly to check for leaks
  - Temperature and pressure audits
  - Clean (V)SSC
  - Either perform leak checks monthly automatically or only if there's a problem with the flows
- ESC
  - Scan monthly data a take note of any questionable periods
- RPComm
  - Download monthly data and investigate questionable periods; Check stored "Status" for entire period

FDMS Routine Maintenance (continued)

Quarterly:

- Site
  - Independent flow, temperature, pressure audit
  - Leak check
  - Mass transducer calibration verification
    - Never failed one, but have marginally passed (within 2.5%), also good way to make sure calibration factor (K0) is correctly set in control unit – this would be important if you had to change a mass transducer out.

Annually:

- Site
  - Change large in-line filters upstream of MFCs
  - Check pump vacuum

FDMS Non-Routine Maintenance Issues

- Outdoor enclosure installation in Burlington, VT
  - Data capture ≈ 30% over initial year
  - Shelter air-circulation has been addressed, although still had problems with Burlington unit after circulation improvements made; even after switching from FDMS-A to FDMS-B in October 2003.
  - Moved FDMS to new monitoring trailer in Burlington in January 2004 (Indoor installation).
  - Primary reason for move was that there seemed to be noise associated with abrupt changes in temperature (even between 20 to 15°C). Perhaps the cycling of the heater. Seemed to work best in fall when both AC and heater were on and maintaining constant temperature.

- Indoor installation
  - Initially leak problems associated with seating of FDMS filter.
  - Any other periods of invalidated data were due to AC breaker tripping and shelter temp being elevated. **Shelter temp should be part of validation process.**

- CT FDMS – on loan from EPA Region I
  - Summer '04 – inexplicable positive and negative spikes in concentration for 1-8 hr periods although no status codes associated with these periods.
  - R&P replaced FDMS-A with FDMS-B in November 2004; haven't seen any "spiking" problems since switchover.

FDMS Settings/Configurations

- Analog out channels
  - Can configure up to 3 analog out channels to ESC datalogger
    - PRC 57 – 1hr Mass Conc. (Total PM)
    - PRC 102 – Base MC (Non-volatile PM)
    - PRC 104 – Reference MC (Volatile PM)
  - Set-up a total of 6 channels on datalogger; 3 standard channels to take analog input and 3 math channels to post measurements to correct hour.
  - Storing these three channels properly aids in forecasting, data validation and AQS and web reporting.
  - With the channels setup in the above manner, there's a 6-minute window to capture the right number on the right hour. Therefore, **the FDMS should be set 3 minutes ahead of the ESC logger** and this time difference should be part of the weekly checks.
  - Link to FDMS ESC 8816 Datalogger setup: http://www.rpco.com/customer/support/tsa/amb/8500/8500technote_010804.pdf

- Contact closure channels
  - Two channels used to indicate filter loading > 90% or status codes
  - May be prohibitive due to channel availability limitations (would be a total of 8 analog channels setup in the ESC datalogger dedicated to FDMS – another argument to go digital!!).

FDMS Settings/Configurations (continued)

- Internal data storage
  - Recommend utilizing all 8 possible parameters to be stored at 1 hr (3600s) intervals.
  - Setting up to store all 8 parameters requires data download every 5 weeks to prevent internal data being overwritten.
  - Data file is in a spreadsheet/database friendly comma-delimited file that aids in data validation and troubleshooting problems. When troubleshooting, may need to drop frequency down to 6-min (360s) to better diagnose issues.
  - Many possible parameter could be stored, I typically setup an FDMS to store the following parameters at a 1-hr interval: 1-hr MC (PRC 057), Base MC (102), Reference MC (104), Filter loading (35), Status (41), Noise (13), External Dew Point (114) and Sample Dew Point (99). For troubleshooting, R&P will typically request that the internal data storage settings are set to 99, 100, 110, 111, 112, 113, 114 and 123 at an interval of 360s.

- Other internal settings
  - May be old news to most, but if you want to report measurements in actual conditions, which I think we all do, make sure under the "Set Temp/Flows" menu that "T-A/S" and "P-A/S" are set to **99 for both average (A) and standard (S) temperature settings** and **9 for both average (A) and standard (S) pressure settings**.