

Final Update

Mitigation Measures & Monitoring Activities for the Union Pacific Roseville Rail Yard

Pertaining to the UPRR/PCAPCD Agreement of December 2004



PCAPCD Board of Directors
December 10, 2009



Presentation Overview

- Background
 - Historical Perspective
 - Results of Initial Risk Assessment
 - UPRR/PCAPCD Agreement
- Agreement Elements & Results
 - Mitigation Plan, Grant Program
 - Air Monitoring Project (RRAMP)
- Facility Emission Trends
- Findings and Conclusions
 - Continuing Activities



ARB RAIL YARD STUDY

Historical Perspective

Why a study of the rail yard?

- Major Rail yard expansion in 1996
- Citizens complaints to District regarding odors & noise
- Citizens concerns regarding Toxic Air Contaminants (TACs)
- District concerns about diesel PM and its impact on public health
 - Diesel PM designated a TAC by ARB in 1998
- District unable to resolve complaints
 - District asked ARB to conduct a risk assessment of the rail yard in March 2000



ARB RAIL YARD STUDY

Results of Initial Risk Assessment

- Year 2000 diesel PM emissions: 25 tons per year
 - Moving locomotives account for about 50% of emissions, idling locomotives about 45% and testing accounts for about 5%

- Large region impacted by the diesel PM emissions
 - Potential cancer risks greater than 500 in a million northwest of the Service Track area and Hump and Trim (10-40 acres)
 - Potential cancer risks greater than 100 in a million over 700-1600 acres
 - Potential cancer risks greater than 10 in a million over 46,000-56,000 acres impacting between 140,000 and 155,000 people

- Results presented to the District Board and the public in October, 2004

Since then every major rail yard (18) in the State has had a risk assessment conducted based upon the Roseville Rail Yard model



UPRR/PCAPCD AGREEMENT

Release of the Study led to a December 2004 Agreement to reduce emissions at the rail yard and contained three elements:

- Mitigation Plan

- Reduce 10% additional DPM emissions from rail yard by the end of 2007
- UPRR indicated that they had already reduced emissions by 15% from the initiation of the ARB risk assessment (that commenced in 2000)

- Grant program

- Provide grants of at least \$150K to achieve a one ton DPM reduction from other sources of background emissions in the Roseville area

- Monitoring Project

- Provide at least \$100K to monitor DPM emissions from the rail yard



AGREEMENT ELEMENTS

Mitigation Plan and Results

Mitigation Plan developed with UPRR and presented to your Board in April 2005

- Unnecessary idling reductions
- Use of low-sulfur diesel fuel for switchers and intrastate locomotives
- Hump and Trim switcher fleet replacement/upgrades
- Investigate emission control from service, test and repair areas
 - Advanced Locomotive Emission Control System (ALECS)

The first two measures focused on reductions throughout the entire facility while the last two targeted the emissions responsible for the highest risk isopleths



MITIGATION PLAN

Details

- Unnecessary idling reductions
 - Retrofited older locomotives with smartstart devices
 - Developed shutdown policy and educate rail yard staff
- Low-sulfur fuel for switchers and intra-state locomotives
 - Began using low-S fuel exclusively for all Roseville fueling (June, 2006)
 - Dispensed up to 2,600,000 gallons per month
- Hump and Trim switcher replacements with gen-set switchers
 - Replaced one in 2007, three in 2008, and two in 2009
- ALECS Phase I Proof-of-Concept testing
 - Completed testing in September 2006 with final report in April 2007



AGREEMENT ELEMENTS

Grant Program & Results

- Goal to achieve one ton of other DPM reductions in Roseville through UPRR contribution to District's Clean Air Grant (CAG) program
- One ton reduction achieved through \$227,000 UPRR contribution
 - Grants used to retrofit four Roseville refuge trucks and replace two Roseville High School buses
 - Grants awarded in 2005, 2006, & 2007 CAG



AGREEMENT ELEMENTS

Air Monitoring Project Objectives

- To determine air pollutant impacts resulting from the emissions emitted from the yard;
- To verify the effectiveness of mitigation measures implemented by the yard;
- To improve the accuracy of future modeling analyses; and
- To provide feedback to the public regarding air quality conditions relevant to objectives (1) and (2).

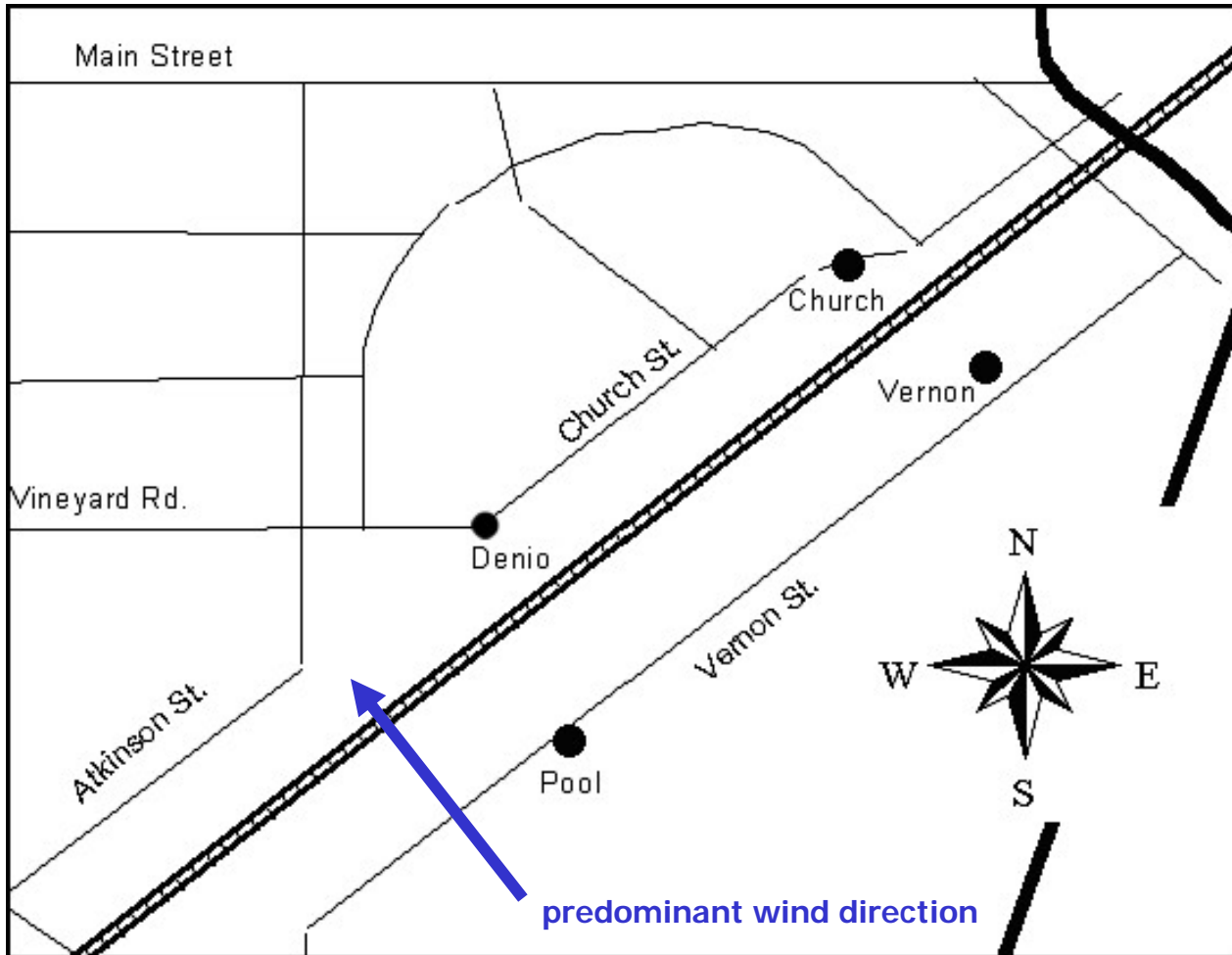


ROSEVILLE RAILYARD AIR MONITORING PROJECT (RRAMP)

- Upwind and downwind analytical strategy
 - Alignment for the predominant wind direction
 - Upwind (background) vs. downwind (background + emissions from yard)
- Studying area
 - Downwind neighborhood area
 - Yard service area
- 4 consecutive summers monitoring
 - Shorter period in 2005 summer
 - June to October in each summer from 2006 to 2008
 - 7 hours overnight period from 10pm to 5am



LOCATION OF RRAMP SITES





TARGETED POLLUTANTS

- Black carbon
 - As a surrogate for the diesel particulate matter
 - Measurements from continuous monitors

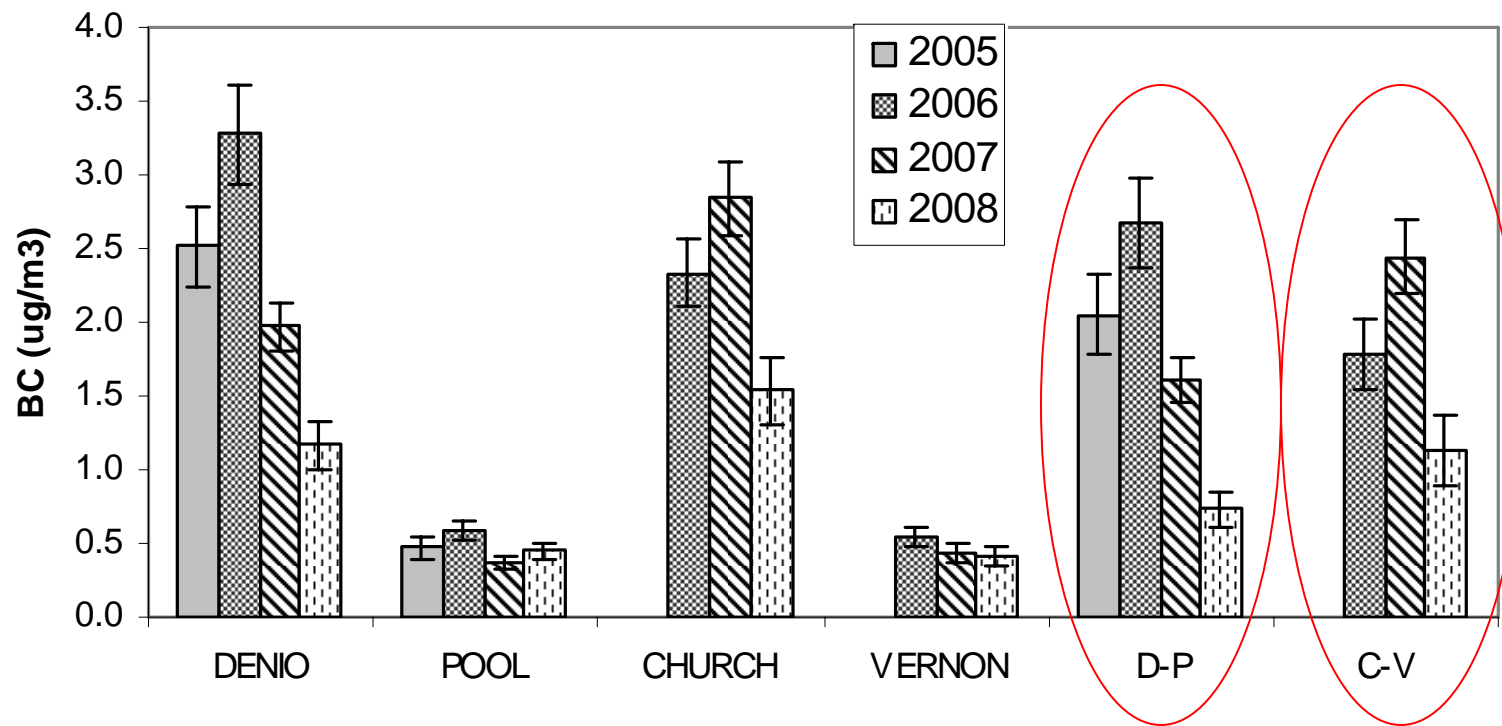
- PM_{2.5}
 - Total particulate matters less than 2.5 micron
 - Measurements from continuous monitors and filter-based samplers

- NO/NO_x
 - As the indicator for fresh emissions from diesel engines
 - Measurements from continuous monitors



BLACK CARBON

4 years Trend Analysis

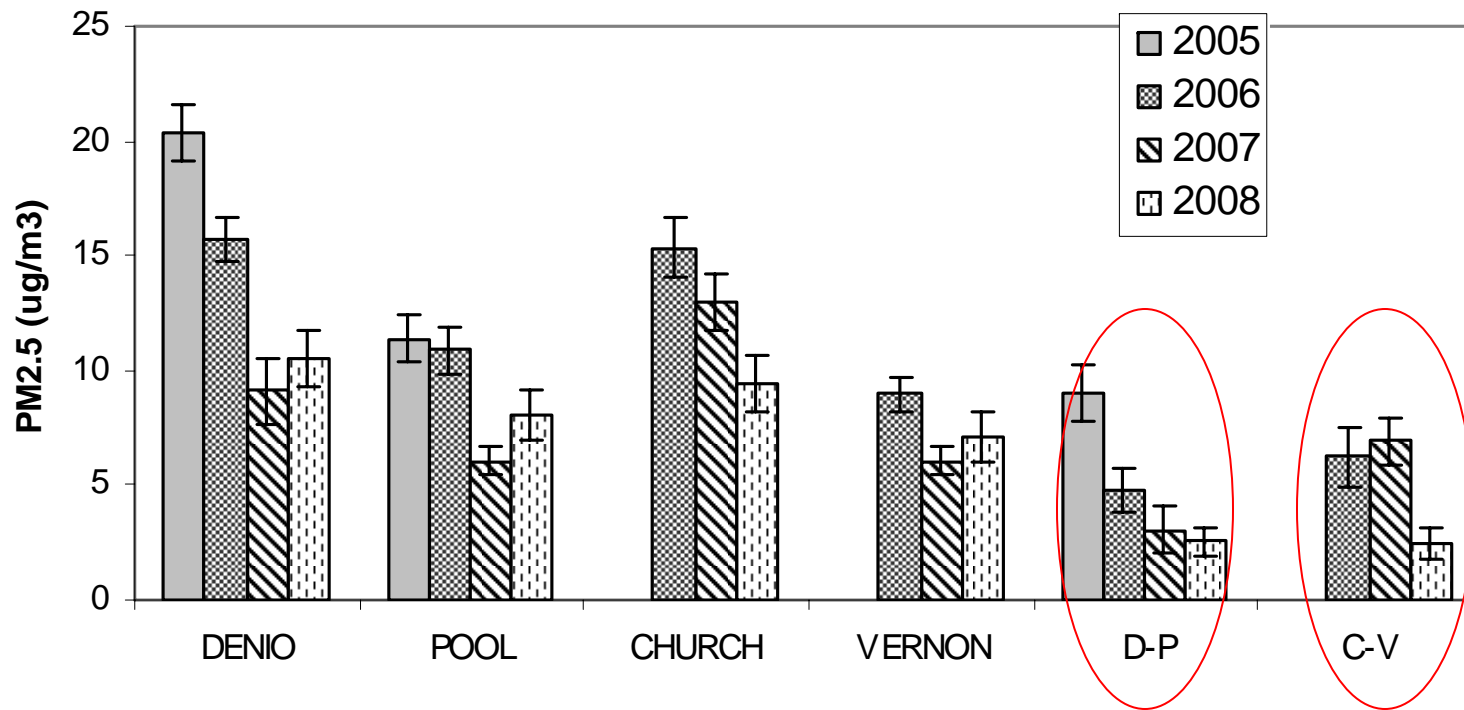


*The analysis for the Church/Vernon pair does not include the 2005 data due to the short monitoring period in 2005 (from September to October)



PARTICULATE MATTER (PM_{2.5})

4 years Trend Analysis

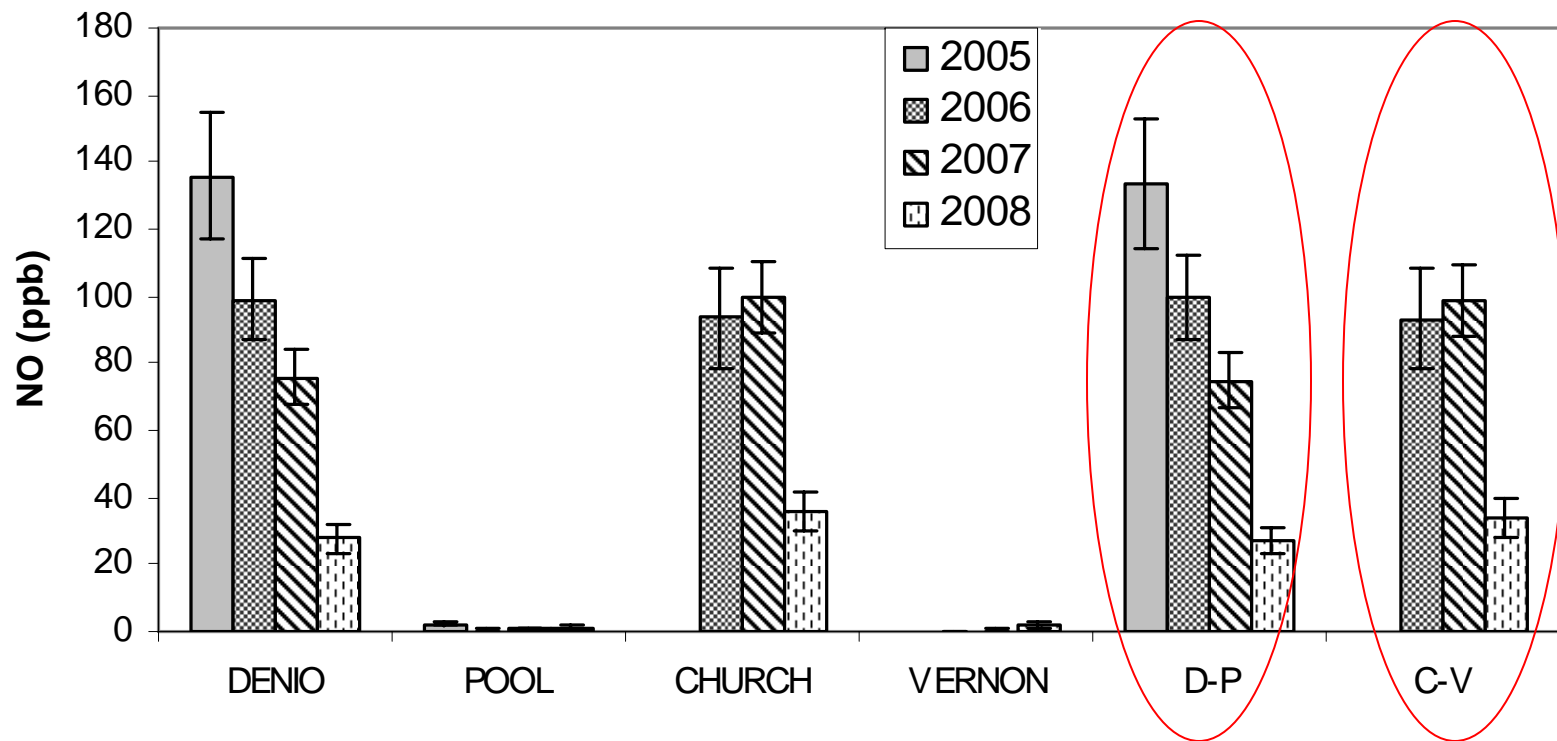


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NITROGEN MONOXIDE (NO)

4 years Trend Analysis

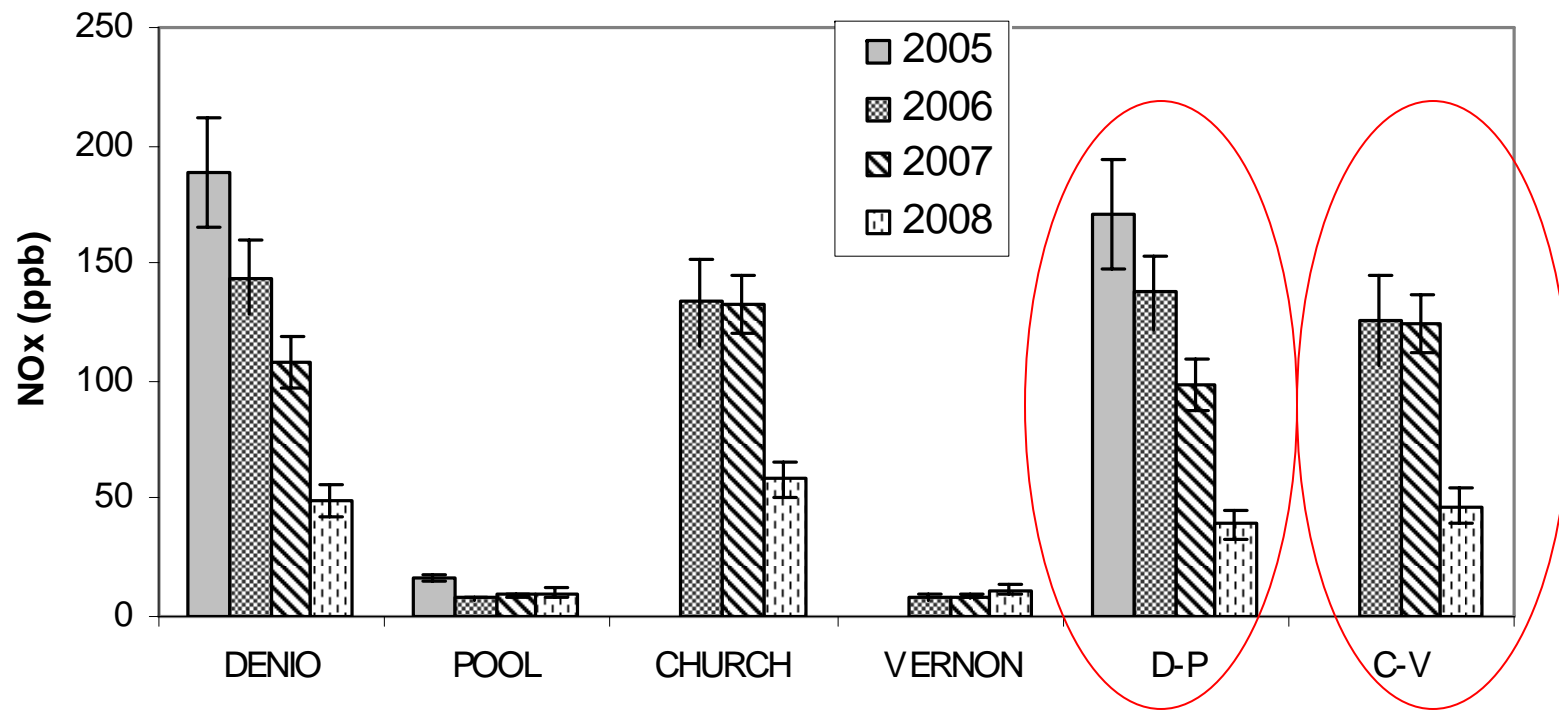


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NITROGEN OXIDES (NO_x)

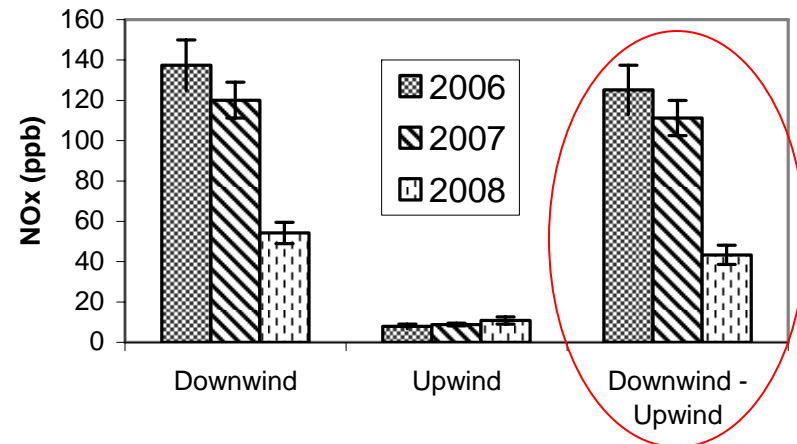
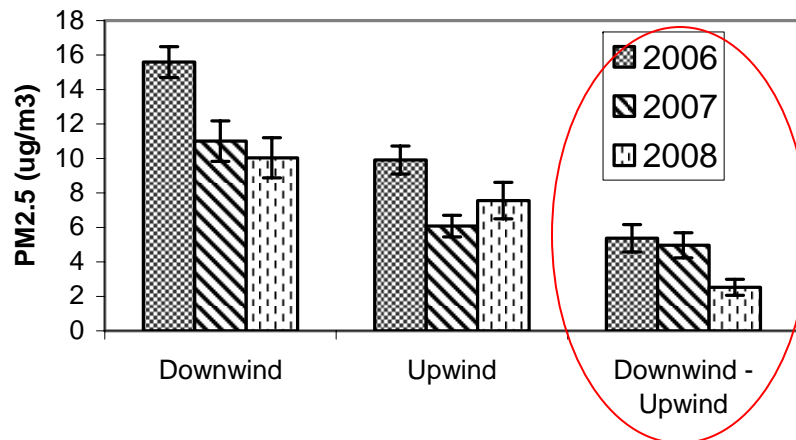
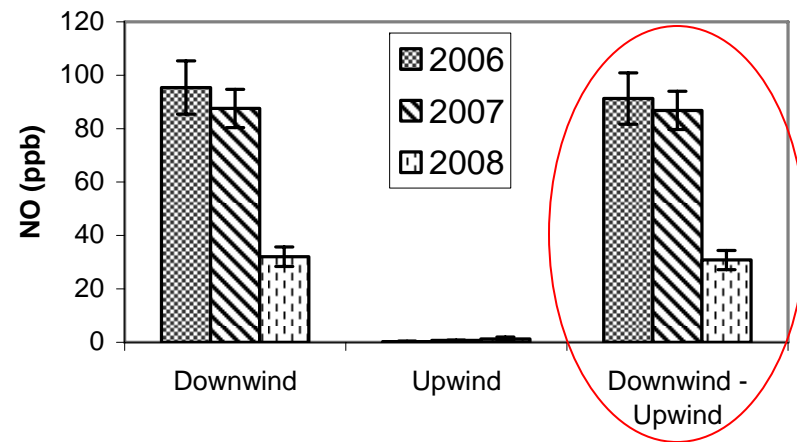
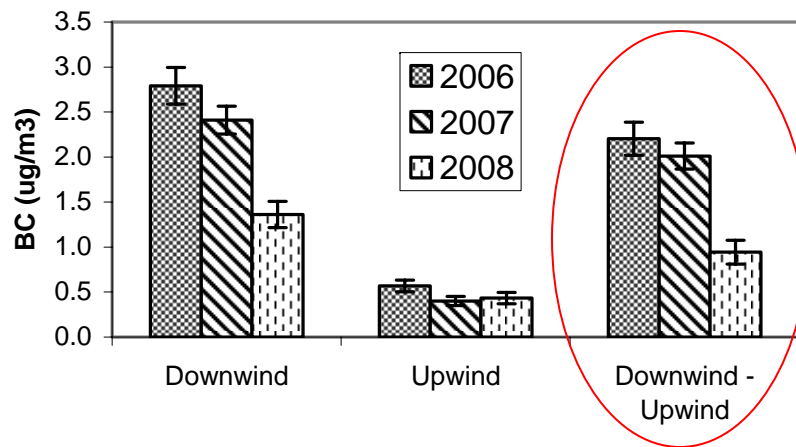
4 years Trend Analysis



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AVERAGE OF UPWIND/DOWNWIND *4 years Trend Analysis*





FINDINGS FROM RRAMP DATA ANALYSIS REPORT

- The ratios of pollutants indicate that downwind sites are indeed picking up the emissions from the railyard.
- Downwind sites show the statistically significant impacts for all targeted pollutants.
- The net average of upwind/downwind difference shows all targeted pollutants having the similar trends from 2006 to 2008.
- The trend shows a small decrease from 2006 to 2007 and a much larger drop from 2007 to 2008.



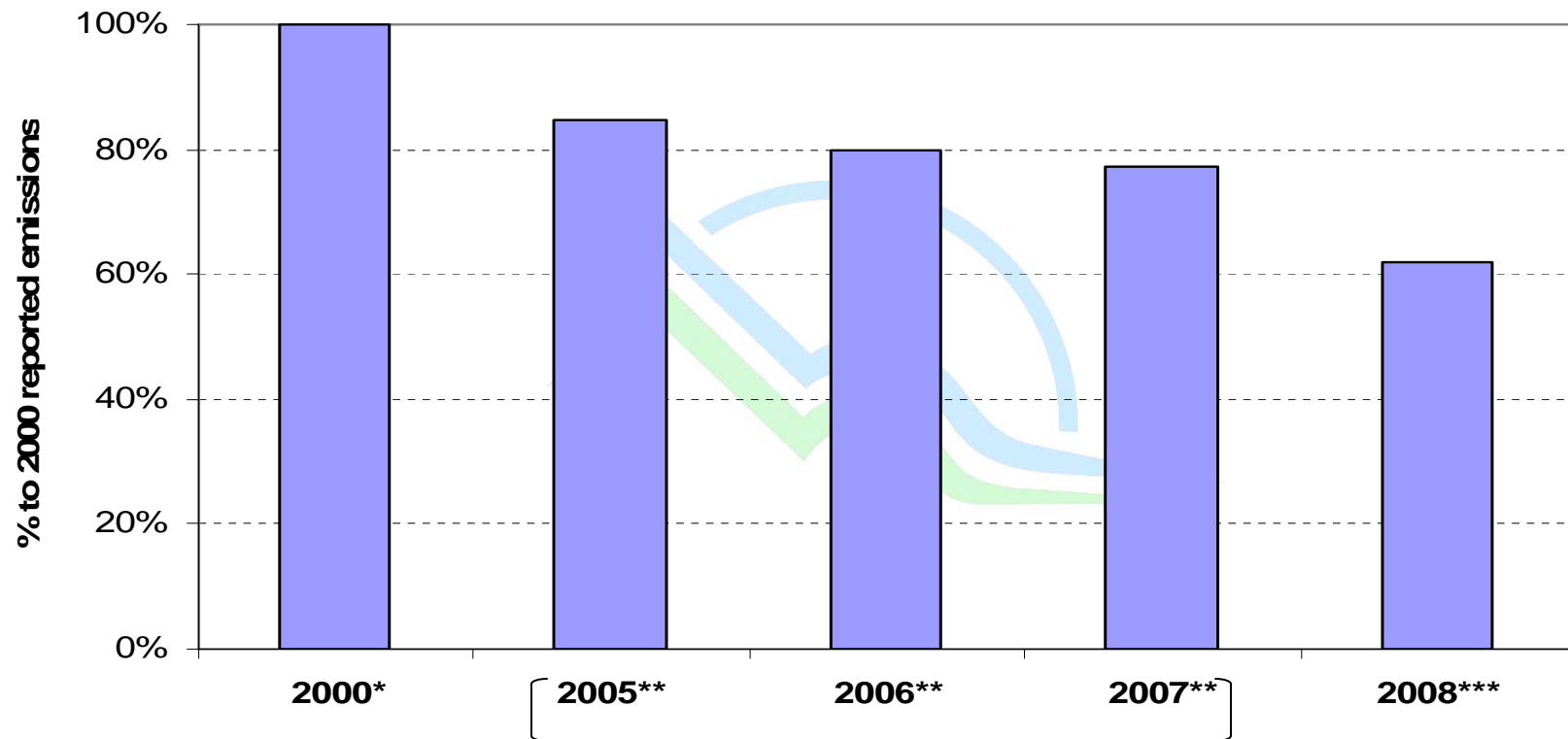
FACILITY EMISSIONS TRENDS

UPRR Emission Trend Report, June 2008

- UPRR presented the report to your Board in October, 2008
- DPM emissions reduced to 19 tons in 2007 (from 25 tons in 2000)
- Additional switcher locomotive replacements in mid-2008 provide substantial additional emission reductions
- Each additional switcher replacement provides 0.6 ton per year DPM reduction



DPM EMISSIONS REPORTED FROM UPRR TREND REPORT



*Emission estimates from CARB 2004 Risk Assessment Study

**Emissions are from UPRR October 2008 Report

***Emissions include the reduction resulting from additional gen-set switchers replacement happened in Yard

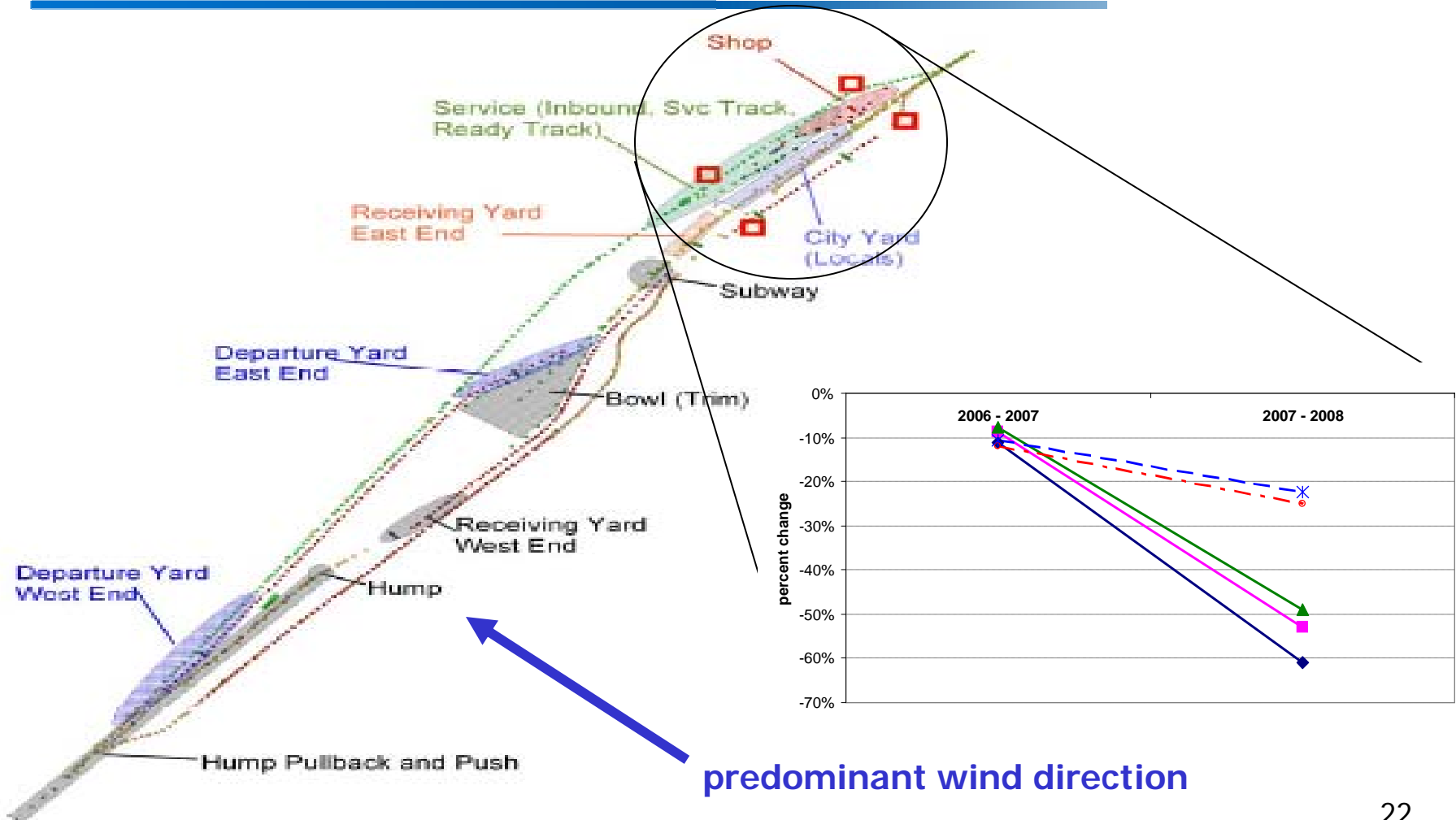


COMPARISON OF RRAMP DATA TO UPRR EMISSION REPORT

- Calculated emissions are based on the emission factors and the daily activity data.
- Measured concentrations are resulted from the emissions and the locations of sources.
- RRAMP studying area is focused on the yard service area.
- The correlation can be recognized by comparing the relative % change in the calculated emissions and measured concentrations from year to year.

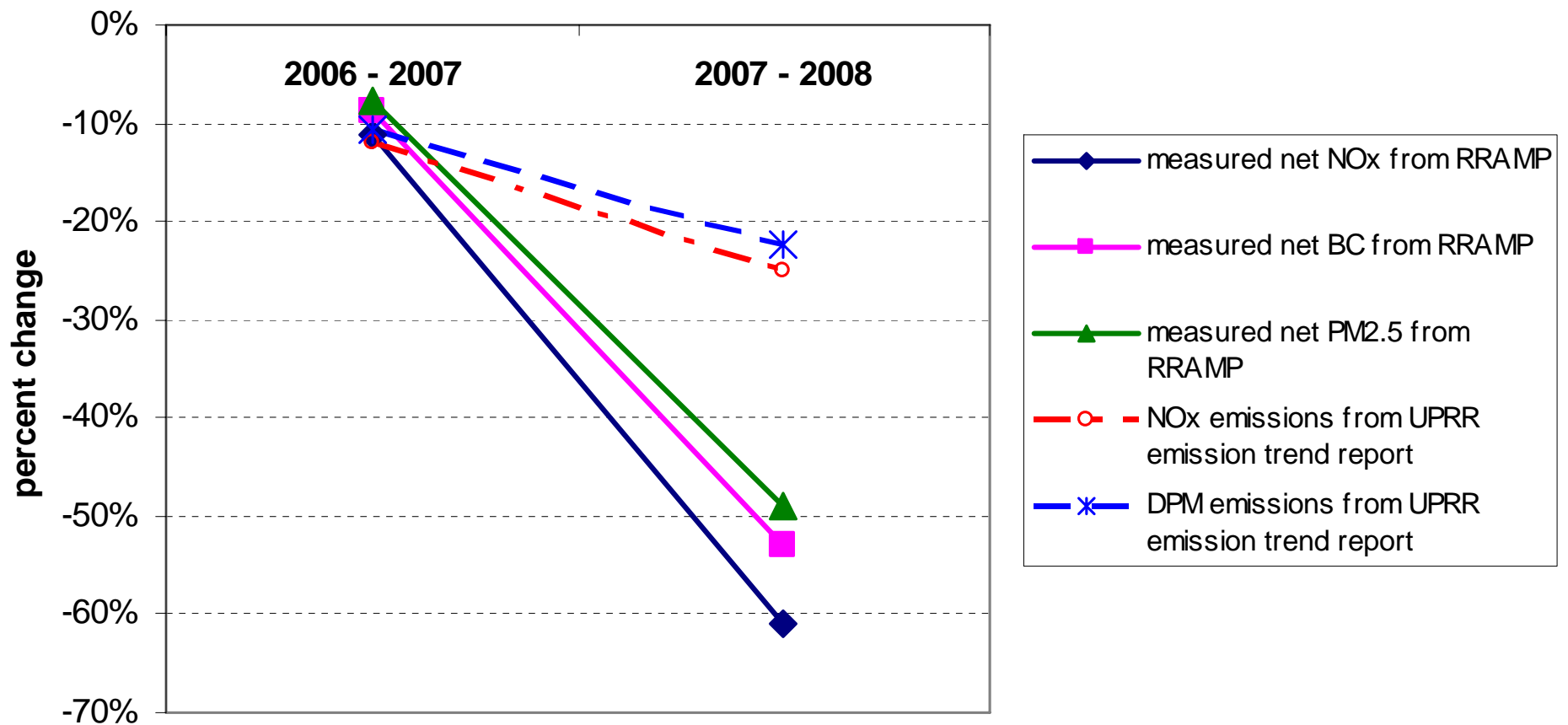


MAP OF RRAMP SITES AND ROSEVILLE RAILYARD





COMPARISON OF RELATIVE CHANGES FROM YEAR TO YEAR





FINDINGS

Emission Trends

- The overall pattern for the relative changes in calculated emissions and measured concentrations is similar (downward)
 - The relative change in 2006-2007 in measured concentrations is close to the calculated emissions.
 - The relative change in 2007-2008 in measured concentrations is much larger than the calculated emissions.
- Staff, after analysis of the 2008 UPRR Trend Report and the results of the RRAMP, concur that there was approximately 23% reduction in overall facility emissions at the end of 2007.
 - Emissions have been further reduced since the end of 2007 because of the switcher replacements as well as lower locomotive activity



FINDINGS

UPRR/District Agreement

UPRR has met the terms of the agreement

- Emission reduction goal met by early 2008
- Grant funds provided and one ton DPM reduced
- Monitoring project supported
 - Technical approach validated by peer review
 - Emissions data successfully collected
 - Numerous technical papers written and published and presented at technical conferences



CONTINUING RAIL ACTIVITIES

Modeling Evaluation

- Funded by UPRR/District, performed by Sierra Research
- Compare DPM levels around the rail yard estimated from the Trends Report with measured levels from the monitoring project
- Extend the evaluation to 2008 activity and monitoring results.
- ARB will aid in extending the DPM levels to health risk for 2008.
- This will provide an updated estimate of current health risk from the rail yard



CONTINUING RAIL ACTIVITIES

ALECS Phase II

- Reliability demonstration of the hoods or bonnets that connect to the locomotives and capture the exhaust
- Slow getting started due to financial hardships caused by down economy
- District holding co-funding from other air districts and cities
- Using care in committing these funds until District has confidence the project can be successfully completed