

Review of NETAC Emission Reduction Strategies and Sensitivity Analysis of Ozone to Northeast Texas Emissions

Presentation to the NETAC
Technical Committee

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Introduction

- Ozone is formed from VOCs and NO_x together
 - Which emission reduction strategies will be effective?
- Review existing NETAC strategies
 - Compare to other Texas EAC areas
- Evaluate ozone sensitivity to local emissions using the 2005 ozone model
 - First step toward planning future strategies

NETAC EAC Strategy Timetable

2002/2003	<p>Developed 1999 ozone model</p> <p>Evaluated emissions sensitivity</p> <ul style="list-style-type: none"> • NOx reductions most effective • Point sources, gas compressors
June 2003	Reviewed potential strategies
2003/2004	Selected and modeled strategies
March 2004	Clean Air Action Plan submitted to TCEQ and EPA
November 2004	TCEQ adopted SIP revision

NETAC Control Strategy Review (1 of 2)

- *Potential strategies for Electric Generating Units*
 - Combustion tuning with advanced NOx control computer programs
 - Low-NOx burner and over-fire air
 - Induced Flue Gas Recirculation
- *Potential strategies for Chemical Plant Operations*
 - Operational Tuning and Control Technology Options for compressor engines
 - Operating Strategy and Control Technology Options for Boilers
 - Enhanced Leak Detection and Repair Programs for HRVOCs
- *Potential Strategies for natural gas engines, such as those used in compressors*
 - 3-way catalysts for rich burn engines
 - Selective Catalytic Reduction for lean burn engines
 - Engine upgrade of older, higher-emitting engines

NETAC Control Strategy Review (2 of 2)

- *Potential Strategies for liquefied petroleum gas boilers, such as those used at industrial sites*
 - Low-NOx burners
 - Low-NOx burners plus Flue Gas Recirculation
- *Potential strategies for off-road diesel engines, such as those used in railroad, construction and mining, and agriculture operations*
 - Engine upgrade
 - Equipment upgrade
 - Fuel reformulation with cetane enhancers
 - Fischer-Tropsch fuel use
 - Fuel-water emulsion use
 - Engine retrofit with a Lean NOx Catalyst
 - Engine retrofit with Exhaust Gas Recirculation
 - Engine retrofit with Selective Catalytic Reduction
- *Energy Efficiency Programs*
- *Ozone Awareness Programs*

NETAC Adopted Strategies

- March 2002 SIP revision implemented NO_x reductions at TXU and AEP Power Plants and Eastman Chemical
- Enforceable EAC Measures
 - HRVOC leak detection and repair (LDAR) at Eastman and Huntsman
- Voluntary EAC Measures
 - TERP program (grant applications for lignite mining)
 - Gas compressor Pilot Project (demonstrate catalysts)
 - East Texas Clean Cities Coalition (clean-fuel buses)
 - Energy efficiency programs
 - Ozone awareness program

Strategies in Other Texas EAC Areas

- Austin
 - Vehicle inspection and maintenance (I/M) program
 - Heavy duty diesel idling restrictions
 - VOC rules for degreasing, Stage 1 vapor recovery, and cutback-asphalt use
- San Antonio
 - VOC rules for degreasing and Stage 1 vapor recovery

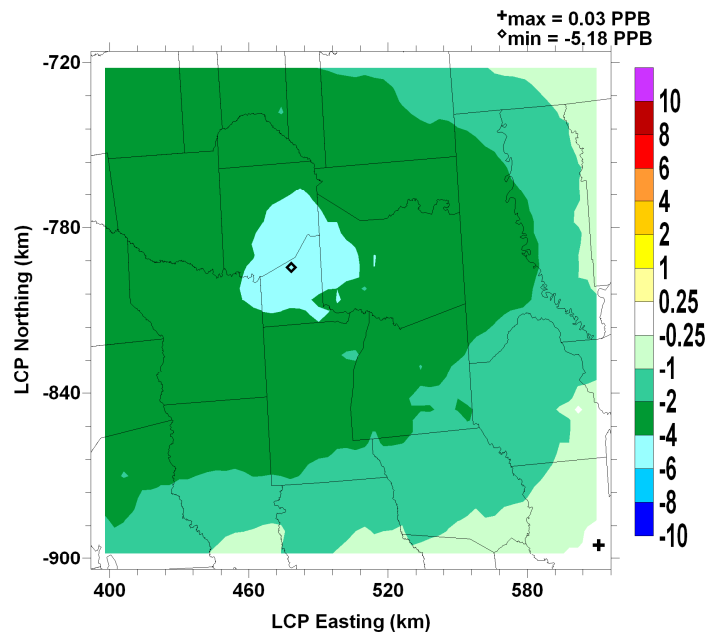
<http://www.tceq.state.tx.us/implementation/air/sip/nov2004eac.html>

Ozone Sensitivity Tests for 2005

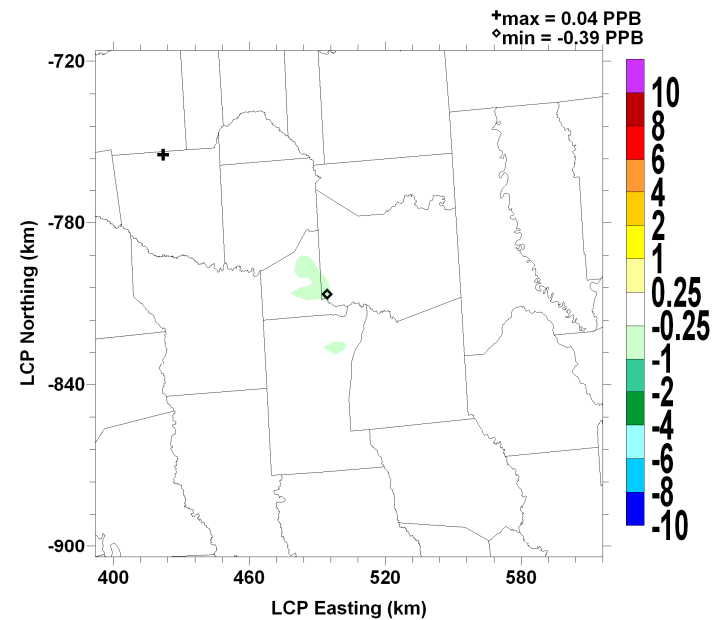
- What types of local controls are likely to reduce ozone in the 5-county area?
 - Reduce all sources of NO_x by 30% in 4 km grid
 - Reduce all sources of anthropogenic VOC by 30% in 4 km grid
 - Shows whether ozone is more sensitive overall to NO_x or VOC reductions
- For NO_x, reduce each source category in turn by 30%. Identify source categories for which reductions will have greatest impact on ozone

30% NOx versus 30% VOC Reduction

Ozone Change: NOx

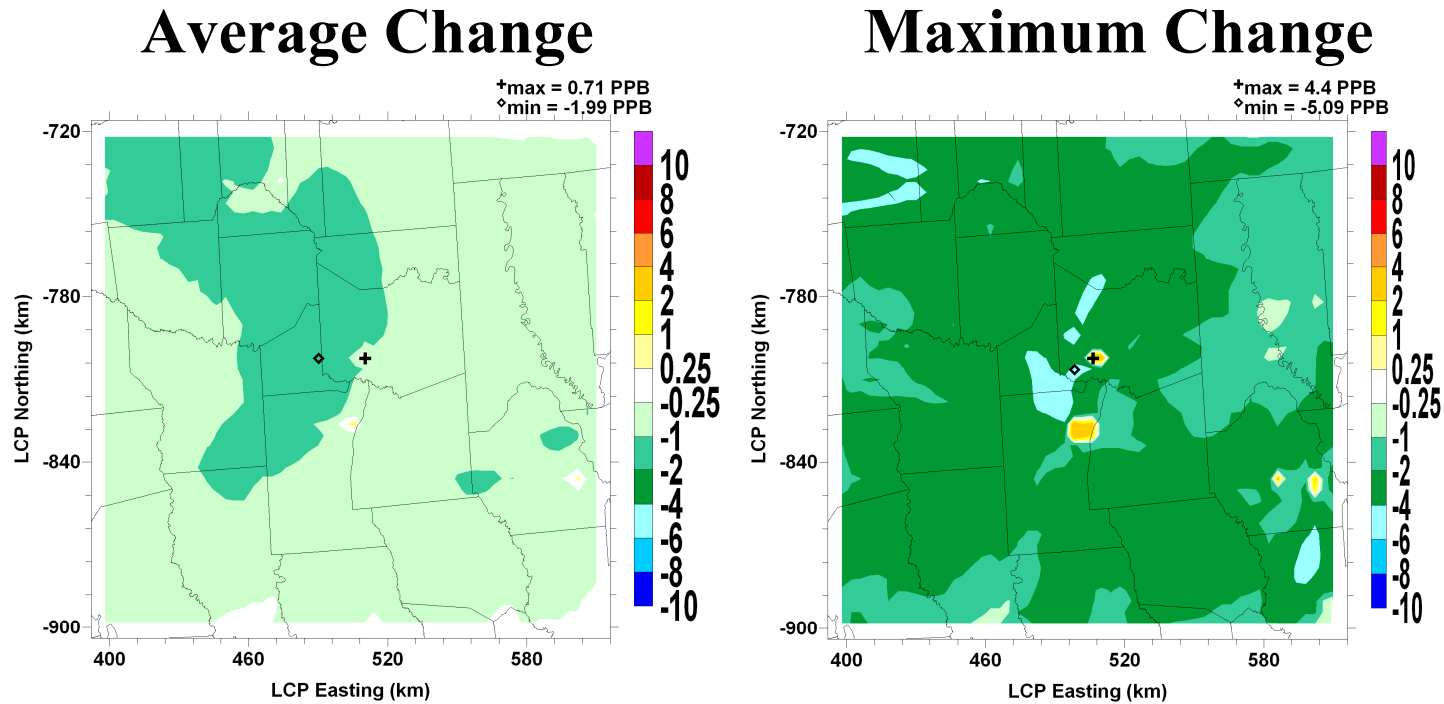


Ozone Change: Anthro VOC



- NOx reductions have greater impact. Ozone formation in NE Texas is limited by the supply of NOx.
- Abundant, highly reactive biogenic VOCs

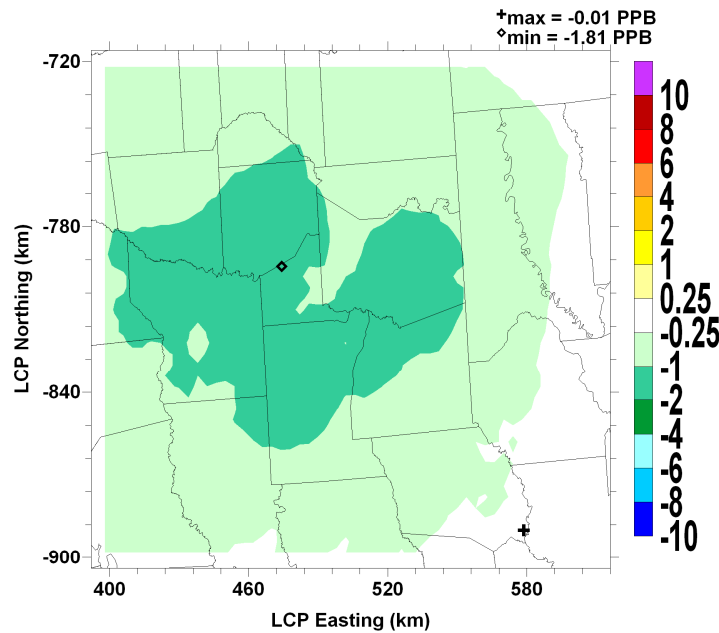
30% NOx Reduction in Point Sources



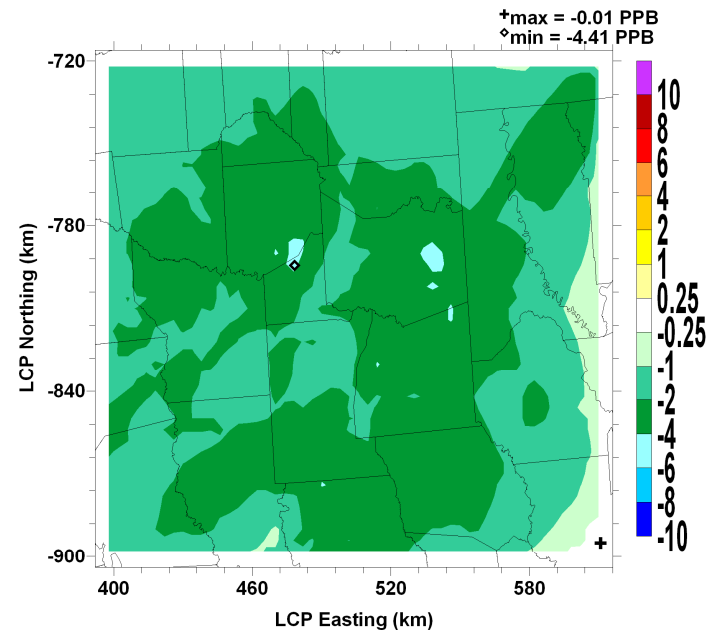
- Source category with largest impact
- NOx disbenefit near power plants

30% NOx Reduction in Area Sources

Average Change



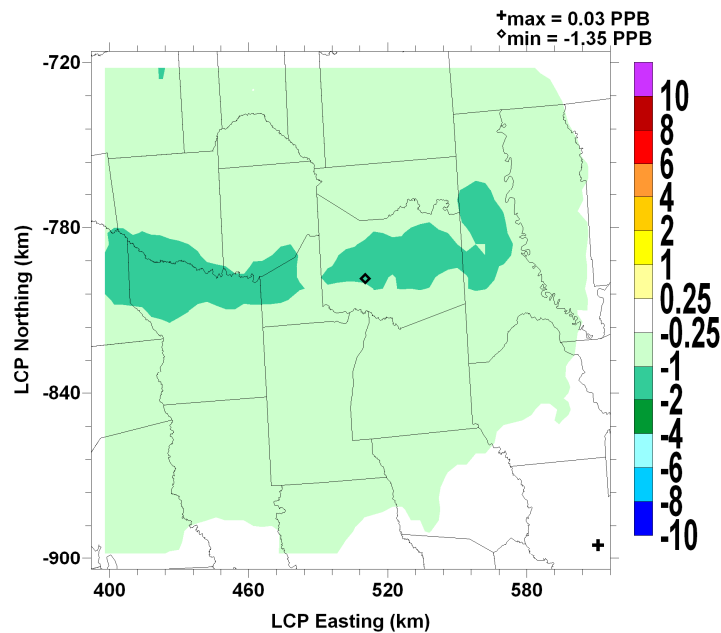
Maximum Change



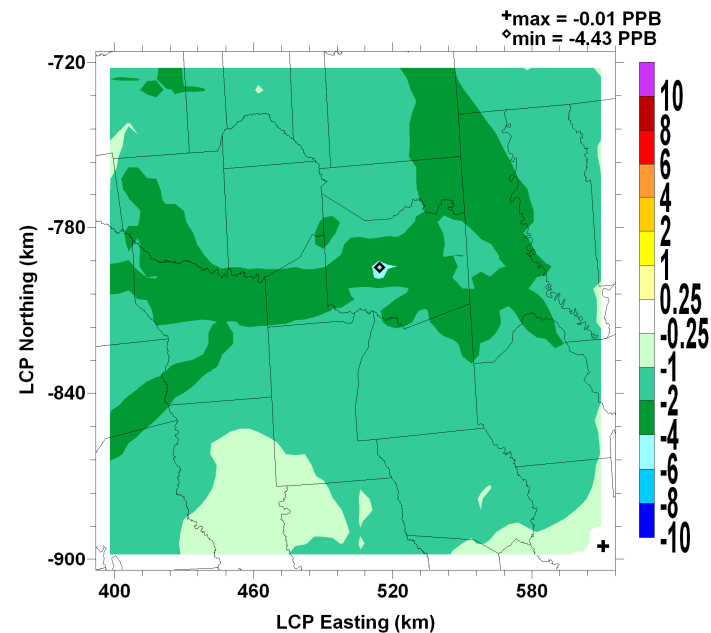
- Impacts are diffuse, relatively small

30% NO_x Reduction in On-Road Mobile Sources

Average Change



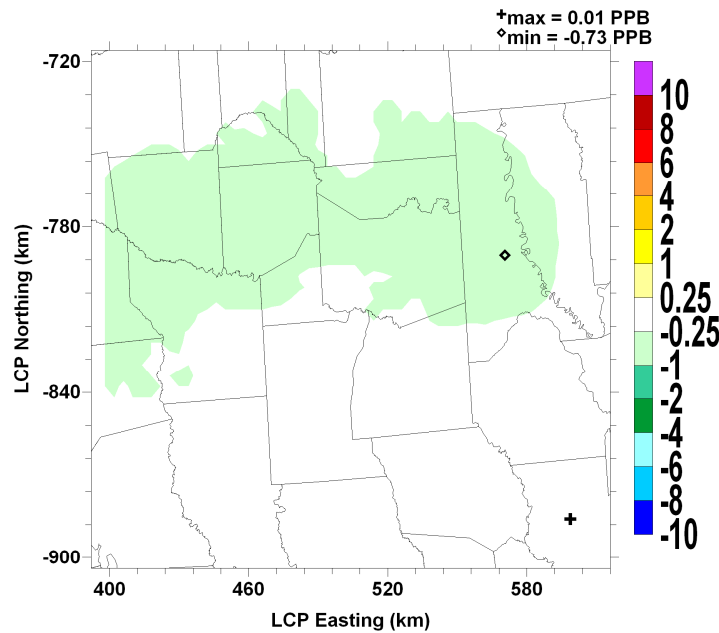
Maximum Change



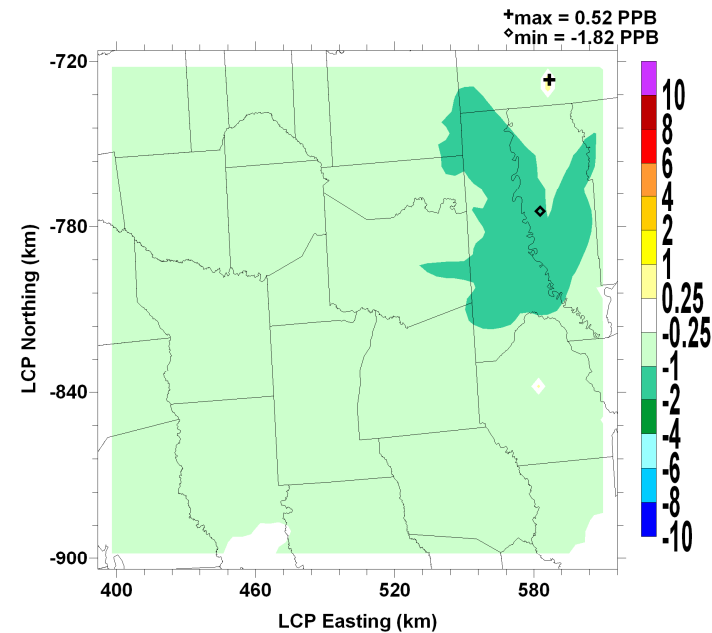
- Greatest differences just north of I20

30% NO_x Reduction in Non-Road Mobile Sources

Average Change



Maximum Change



- Source category with smallest impact

NOx Sensitivity Test Summary: Source Categories Ranked by Impact on Ozone

1. Point sources
2. Area; On-road mobile
3. Off-road mobile

Emission Inventory for the 5-County Area

	Biogenics	Point Sources	Area	On-Road Mobile	Non-Road Mobile	All Anthropogenic Sources
NOx (tons/day)	27	126	76	89	49	339
VOC (tons/day)	1004	37	242	38	29	344

End