Clearing the Air in Houston: Using Science to Address Policy

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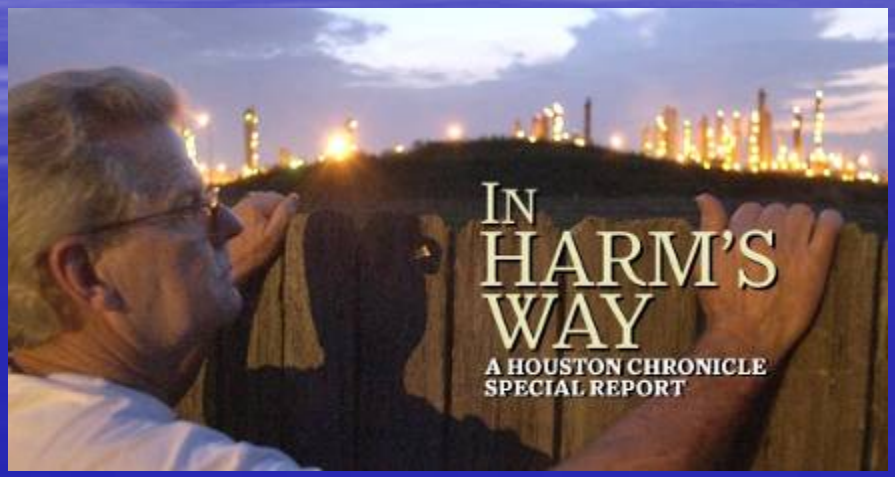
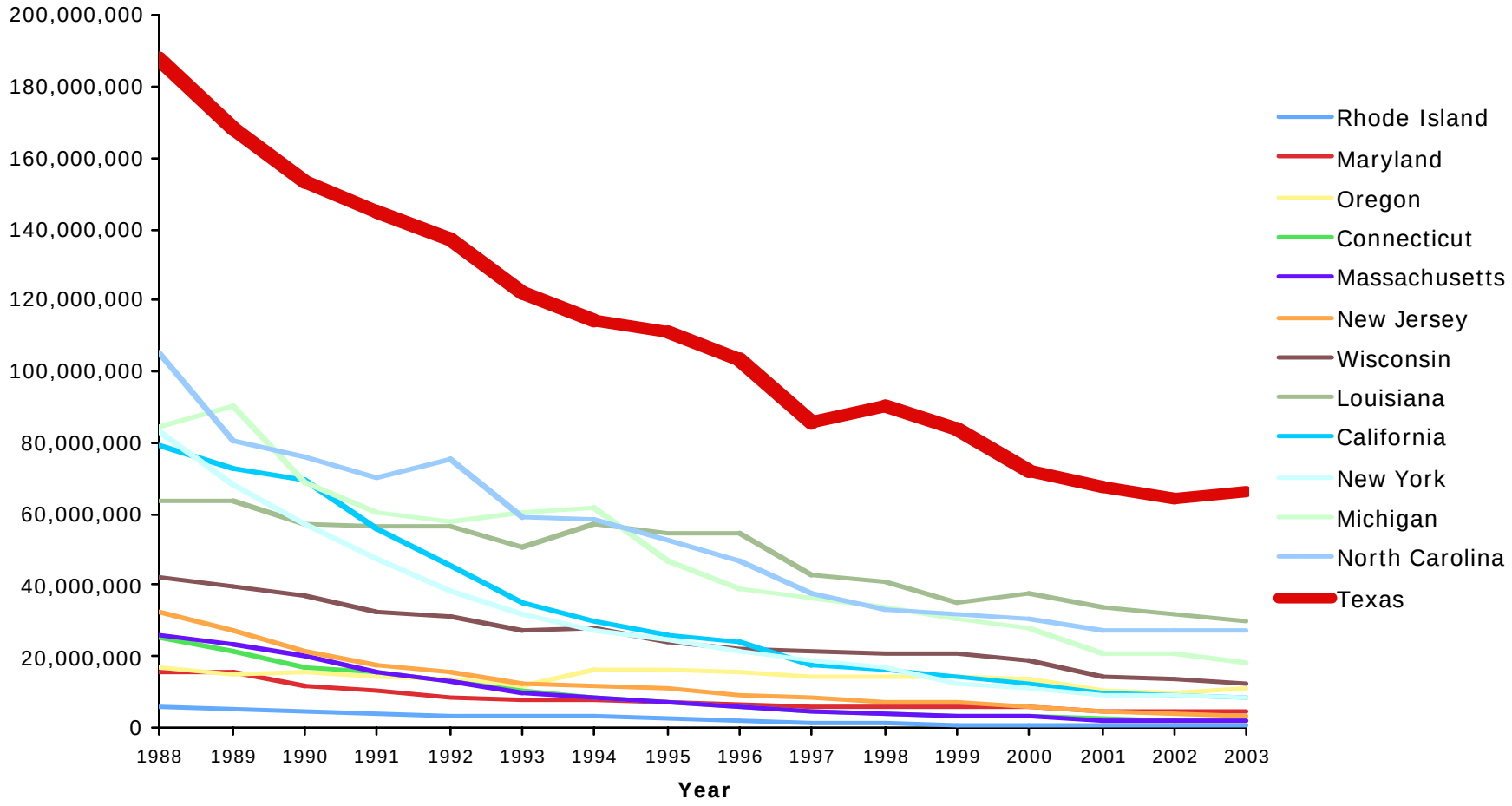
Air Quality Issues - Houston



Awareness about hotspots raised by a series of reports in the Houston Chronicle, 2005

- Ozone – not compliant with Clean Air Act Standard
- Particulate matter – compliant but would violate possible future standard
- Air toxics – Higher than most locations: industrial hotspots

Texas reported air toxics (as defined by the TRI) emissions between 1988-2003 compared to other states



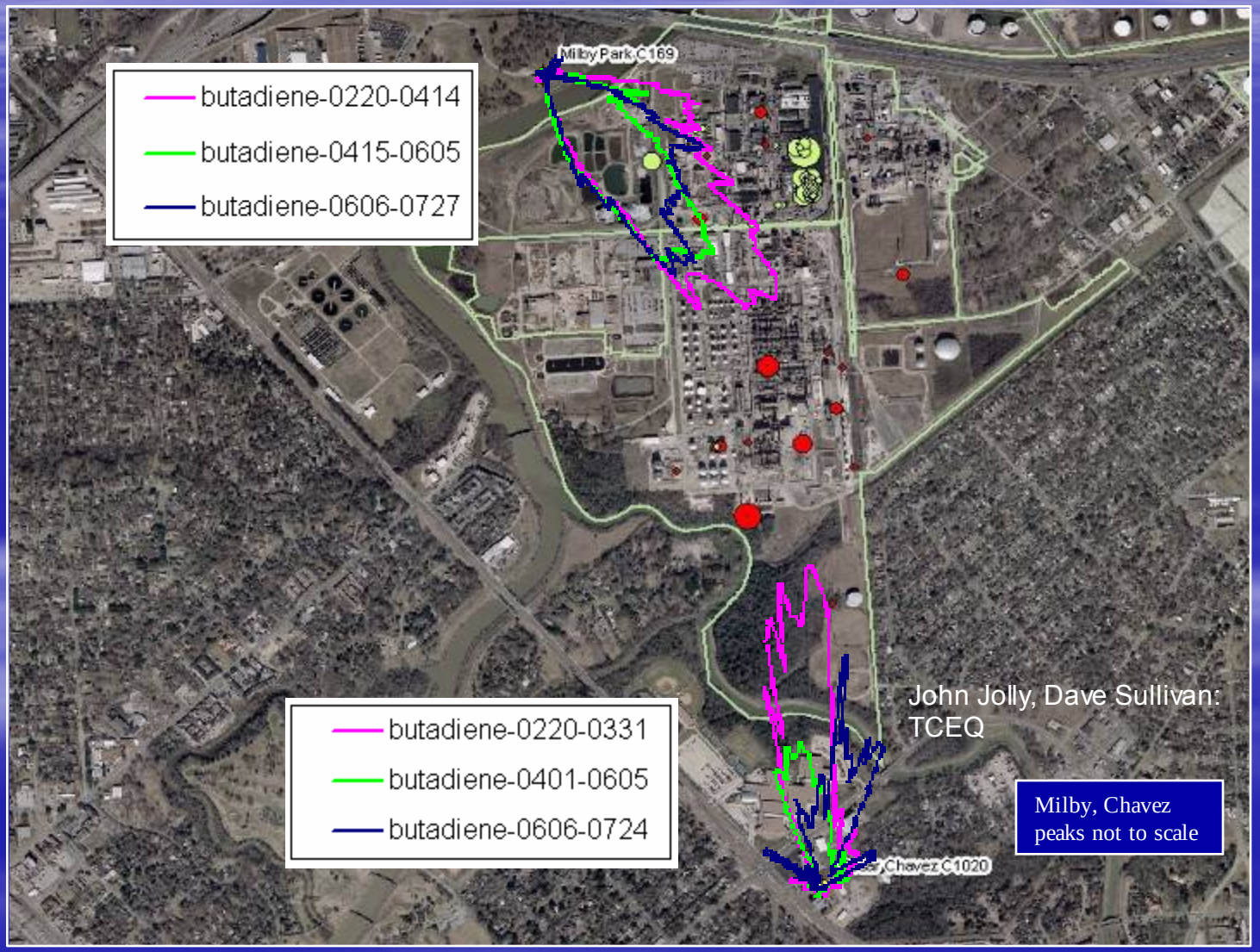
Three Elements in Improved Air Quality

- Changing economic and social priorities
  - Less reliance on petrochemical industry
  - More reliance on human skills requiring a better reputation for quality of life
- Research
  - Sources and mechanisms of pollution
  - Prioritization and recommendations for policy
- Policy to reduce emissions

Research Activities

- Major field studies to understand ozone formation: 2000, 2006
  - Precursor source, mechanisms of formation, fate and transport
- Improved monitoring technologies for air toxics and ozone precursors
  - Automated gas chromatograph monitors, IR imaging technologies (Hawk Camera), others
- Exposure modeling for air toxics and ozone
- Expert studies to set priorities and recommend action for air toxics

Improved technology: use of automated GC monitoring to localize emission sources



Mayor's Task Force on Health Effects of Air Pollution, April 2006

April 2005, the Mayor of Houston, the Honorable Bill White, asked the UT Health Science Center at Houston to help answer a critical science-policy question for action based on scientific judgment:

"Which ambient air pollutants are most likely to cause significant health risks for current and future residents of Houston?"

The Task Force on the Health Effects of Air Pollution was formed under the auspices of the **Institute for Health Policy** based at the University of Texas School of Public Health composed of environmental health experts from:

The University of Texas School of Public Health
The University of Texas Medical Branch at Galveston
The University of Texas M.D. Anderson Cancer Center
Baylor College of Medicine
Rice University

Slide From Heidi Bethel, EPA

Approach

- Prioritized 179 hazardous air pollutants based into 5 risk categories, definite (12), probable (9), possible (24), uncertain (118) unlikely (16)
- Elements considered
  - Exposure estimates based on models (NATA), and ambient air monitoring (air quality study 2004)
  - Population exposed by census tract
  - Population risk based on exposure levels and unit risks or reference values from risk assessments

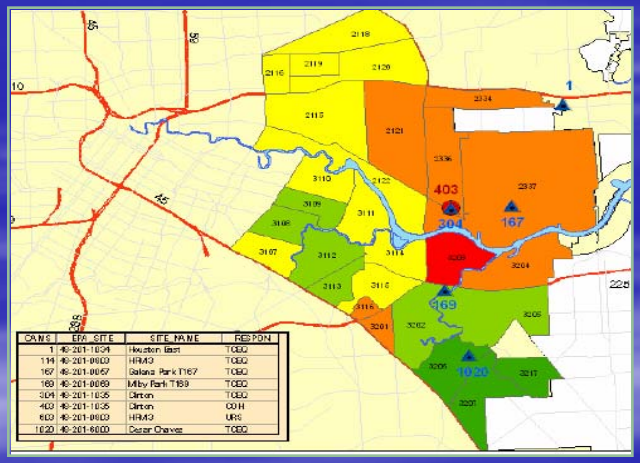
East Houston - A Case Study

Emissions Characterization

- 50% of point sources of Greater Houston located in East Houston
- Over 20 large industrial sources located in East Houston
- The Port of Houston, and the Ship Channel generate a variety of pollutants
- Interstate Highways 10, 610 and 45 and State Highway 225 intersect this area

EAST HOUSTON

Denver Harbor/Port Houston, Pleasantville, Clinton Park/Tri-Community, Magnolia Park, Lawndale/Wayside, Harrisburg/Manchester, Pecan Park, Park Place, and Meadowbrook/Allendale



Super neighborhoods included in the assessment

Sociodemographics

- Average family income more than 30% lower than City of Houston
- Over 25% of of the residents fall below the poverty level
- Almost 20% of the residents have less than a 9th grade education
- Some of the highest uninsured rates for health coverage in Harris County

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Definite Risk Chemicals

- Ozone
- Particulate matter ($PM_{2.5}$)
- Diesel particulate matter
- 1,3-Butadiene
- Chromium VI
- Benzene
- Ethylene dibromide
- Acrylonitrile
- Formaldehyde
- Acrolein
- Chlorine
- Hexamethylene diisocyanate

Recommendations of Task Force

- Control efforts should be focused on the twelve “definite risk” pollutants
- Control the twelve pollutants in neighborhoods with the highest relative exposures – East Houston Neighborhoods
- Use report as ‘decision tool’ for organizing and analyzing information about air pollution to better direct decision making process and resource allocation

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The Control of Air Toxics: Toxicology, Motivation and Houston Implications, Houston Endowment Inc and Rice University, September 2006

- Panel from several local universities: engineering, toxicology, law, social science
- Assess science used to set air toxics guidelines and standards
- Concentrate on four pollutants of concern
  - 1,3-butadiene
  - Benzene
  - Diesel particulate matter
  - Formaldehyde
- Identified EPA IRIS and CAL EPA risk assessments as primary sources for air toxics guidelines for most states
- Based on risk assessments recommended setting cancer risk levels at 1 in one million
- Create health based, enforceable standards

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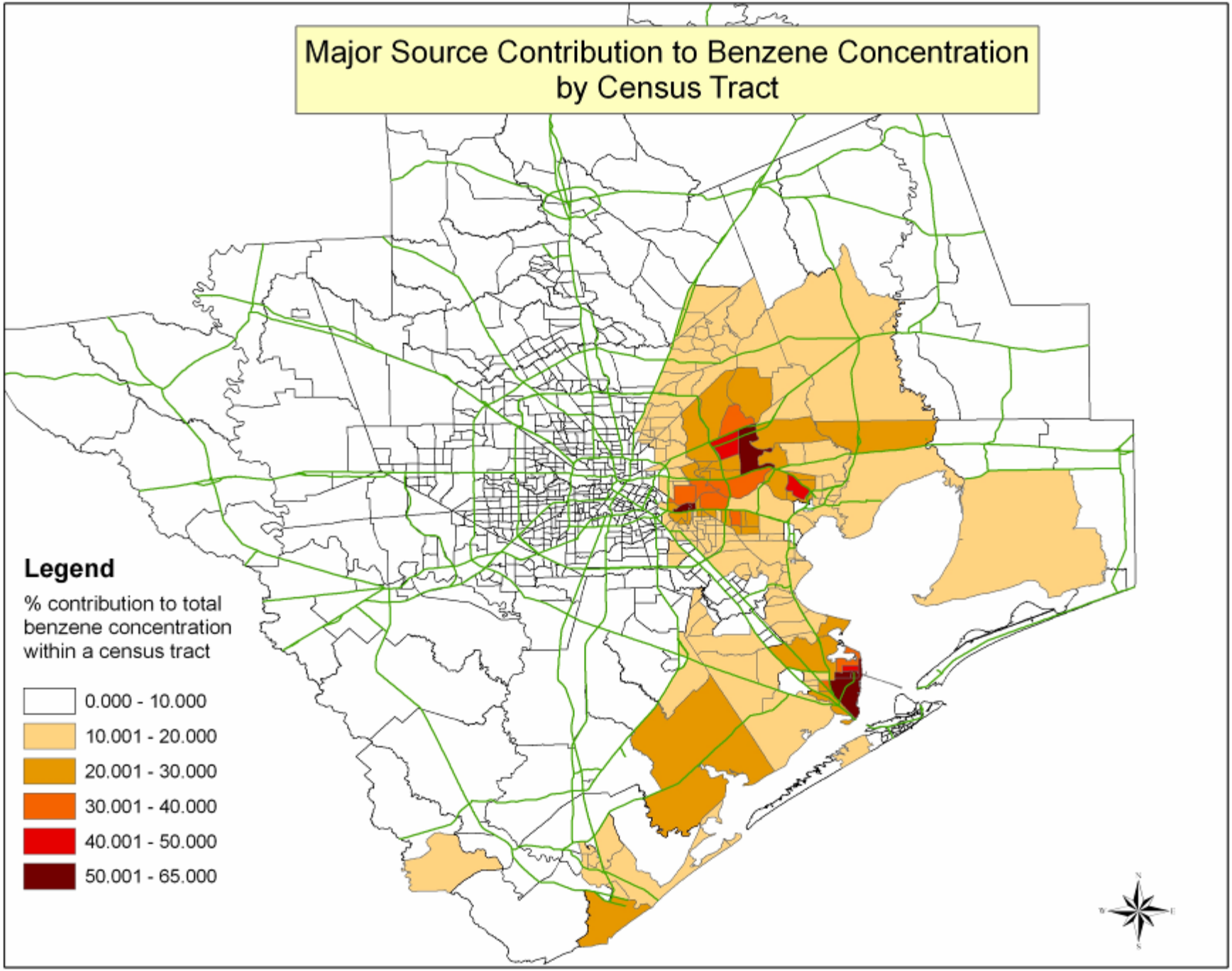
Policy: Plants and people in close proximity

Butadiene Emissions Reduction Agreement, December 2005

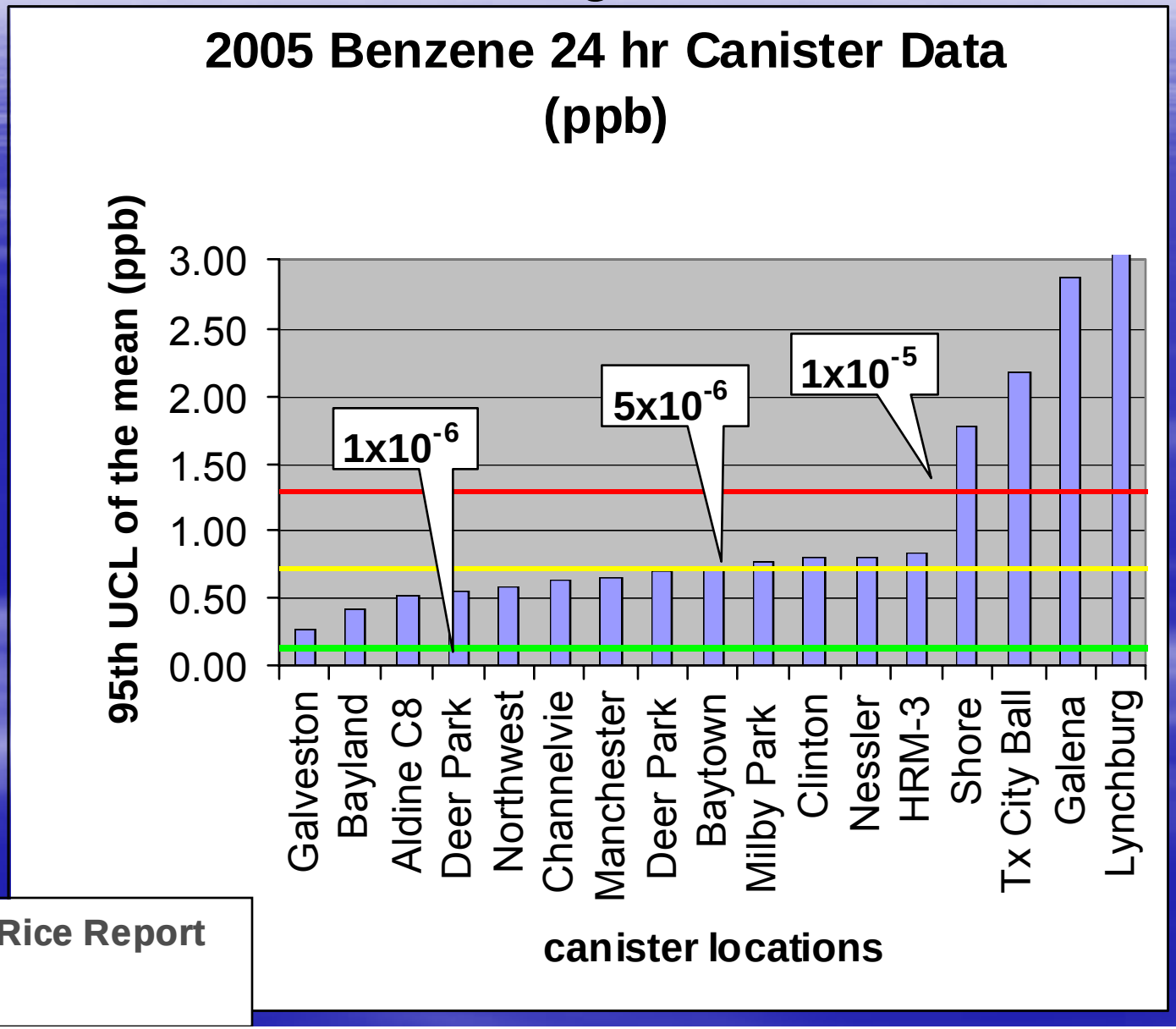
- Supported by Auto GC data and risk assessments
- Enforceable agreement to:
  - Reduce 1,3-butadiene chemical plant emissions by nearly 20 tons-per-year;
  - Monitor fence line, make data accessible and reduce offsite 1,3-butadiene impact to ≤ 1 ppbv; and
  - Provide alerts for flaring events, elevated fence line concentrations and leaks into cooling water.
  - Reduced average ambient levels from 4 ppb to 1 ppb in two years

Nuisance Ordinance and Benzene Reduction Plan, January 2007

- Proposed revisions to the local nuisance ordinance
  - Identifies air toxic levels considered to be a nuisance.
  - First draft identified the nuisance level as above the 1 in a million cancer risk level and above the reference concentration for non-cancer health effects.
  - Latest draft specifies nuisance levels for the 10 definite risk non-criteria air contaminants, provides affirmative defense for sites with emissions reduction agreements and a phased approach.
  - Currently being refined with collaboration of task force including the business community.
- Benzene Reduction Plan
  - Identified top 10 Houston area benzene emitters based on self-reported data and 10 sites with the highest associated health risks from benzene emissions using NATA.
  - Seven sources appeared on both lists-these seven sources are the initial focus for reduction discussions.
  - Reviewed emissions inventory data for each of the seven sites to develop initial site specific emissions reduction plans.



Health risks at different locations based on monitoring data



Risk Values-Rice Report

Data- TCEQ

Plan Components

- Set emission reductions goals over a five year period
- Commit to necessary capital and operational enhancements
- Demonstrate steady, annual progress toward emission reduction goals
- Verify reductions through monitoring
- Consequences

Benzene Plan Focus for Major Sources

- Coker Units @ Refineries
- Flares
- Control emissions using detection technologies: LDAR (DIAL and GasFindIR)
- Wastewater
- Monitoring (DIAL, mobile lab, stationary)
- Tank improvements

For More Information

- http://www.houstontx.gov/environment/reports/benzenereductionplan.pdf

Acknowledgements

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Mayor's Task Force

Rice/HEI study team