City of Houston
1,3-Butadiene Plant
Settlement Agreement

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Outline

- Background information:
- ✓ The City of Houston (COH), Bureau of Air Quality Control (BAQC)
- ✓ 1,3-Butadiene Plant
- ✓ The surrounding community
- ✓ 1,3-butadiene
- ✓ The monitoring data
- Enforcement and Permitting Results Summary
- Details of the Settlement Agreement
- Moving Forward

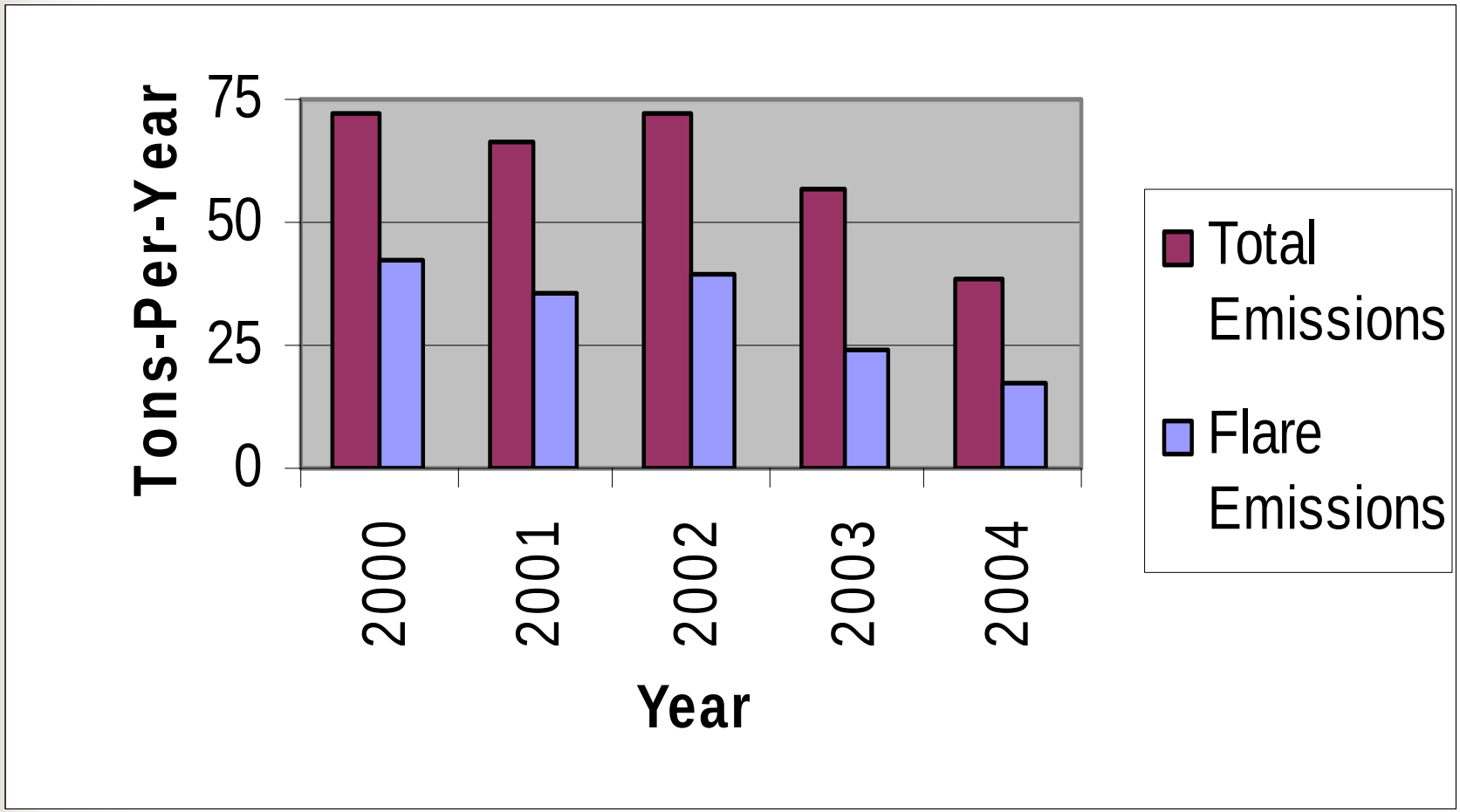
City of Houston, Bureau of Air Quality Control (BAQC)

- Air Monitoring
- Complaints
- Community Assistance
- Special Initiatives
- Emissions Events/LDAR
- Permits
- Data Review
- Enforcement

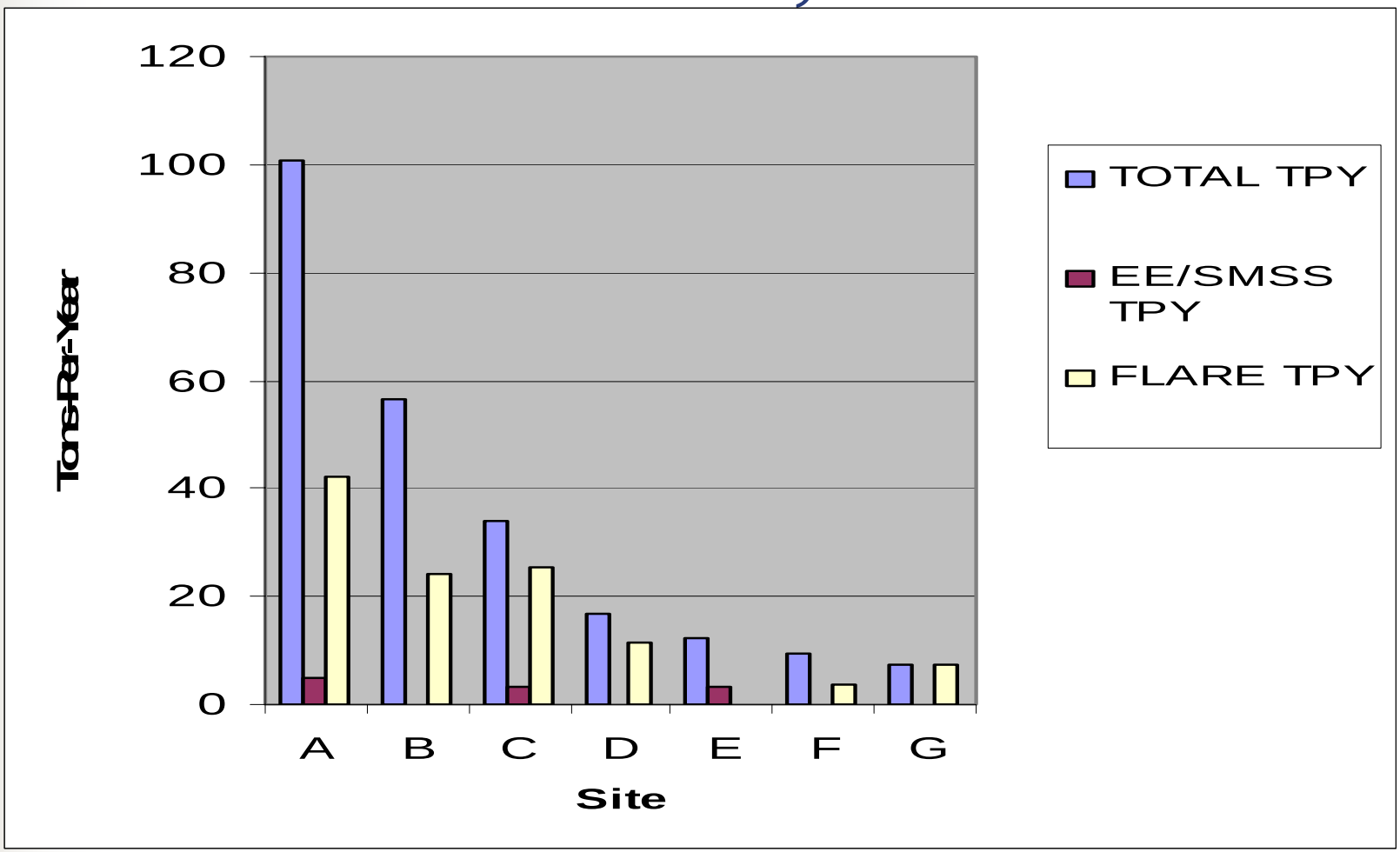
1,3-Butadiene Plant Background

- The facility was constructed in the 1940s by the federal government.
- Current owners acquired the site in 1984 and a new senior management team has been in place since 1994.
- The plant is one of the largest producers of 1,3-Butadiene in the US.
- The plant also has the largest butene -1 extraction capacity in North America.
- The plant is also one of North America's largest producers of isobutylene and derivatives of isobutylene such as polyisobutylene, di-isobutylene and isobutylene concentrate.

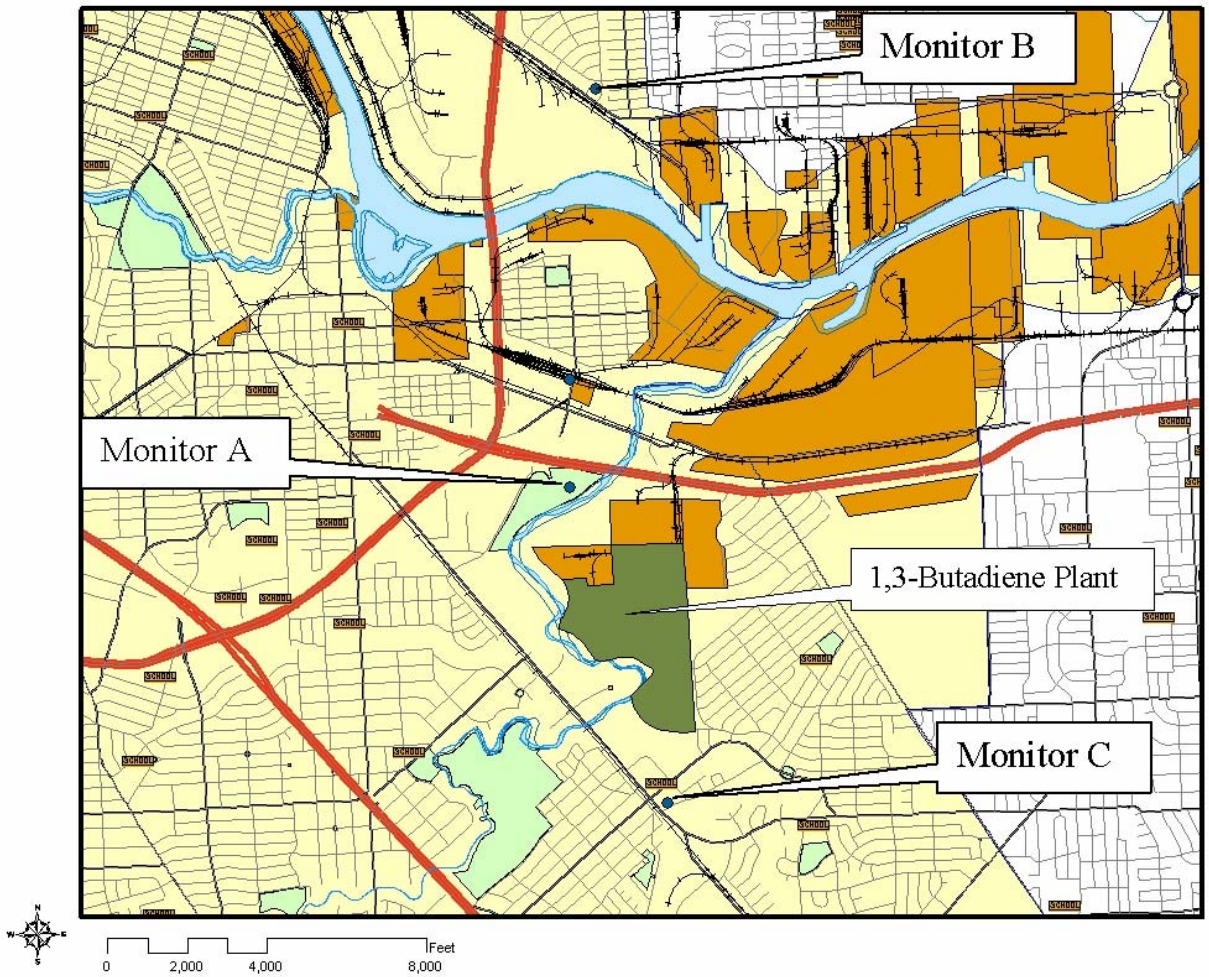
1,3-Butadiene Plant Emissions



Largest Harris County 1,3-Butadiene Sources, 2003



1,3 Butadiene Plant and the Surrounding Community



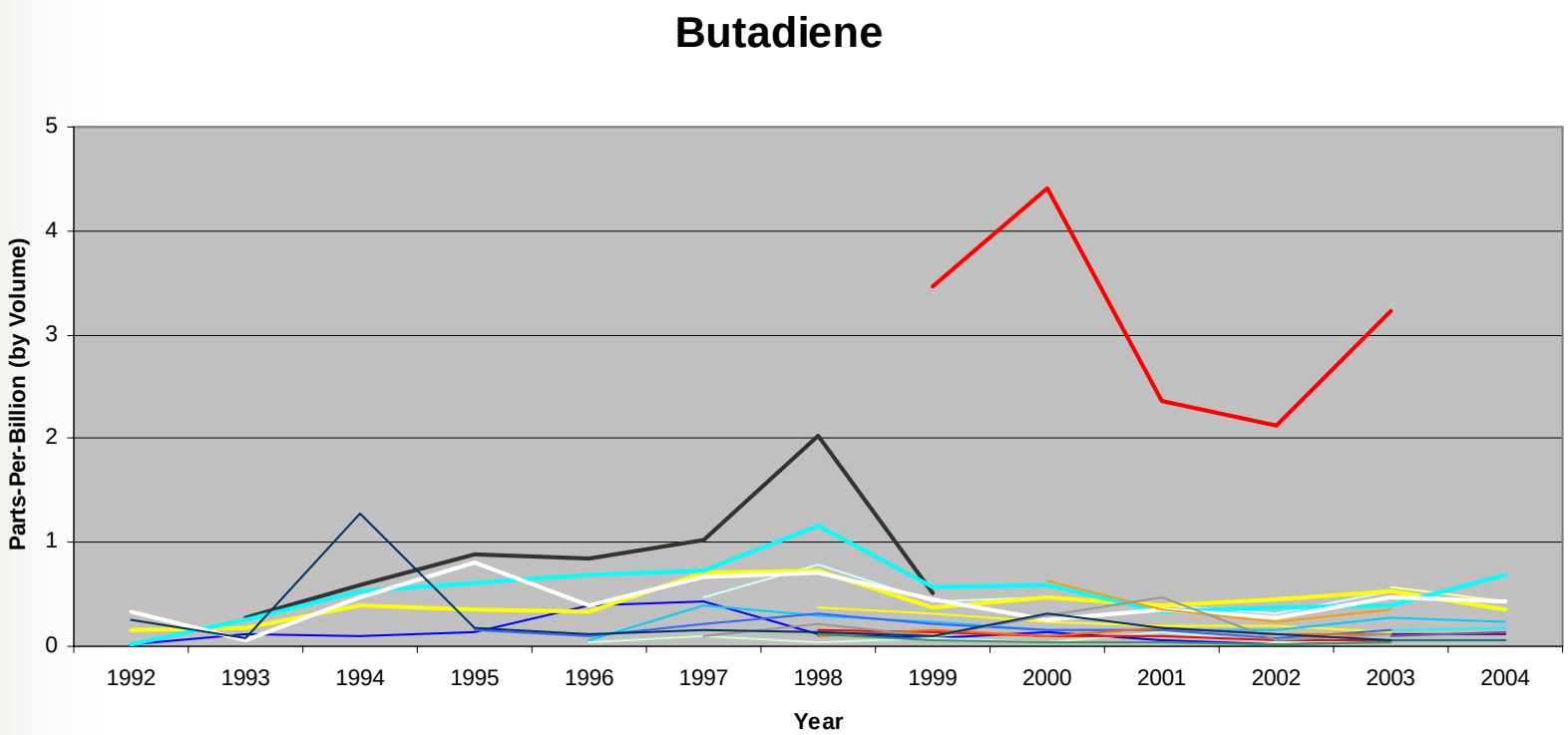
1,3-Butadiene Information from EPA

- Colorless gas with a mild gasoline-like odor
- Odor threshold is 1,600 parts per billion (ppb)
- EPA's cancer unit risk factor from IRIS is:

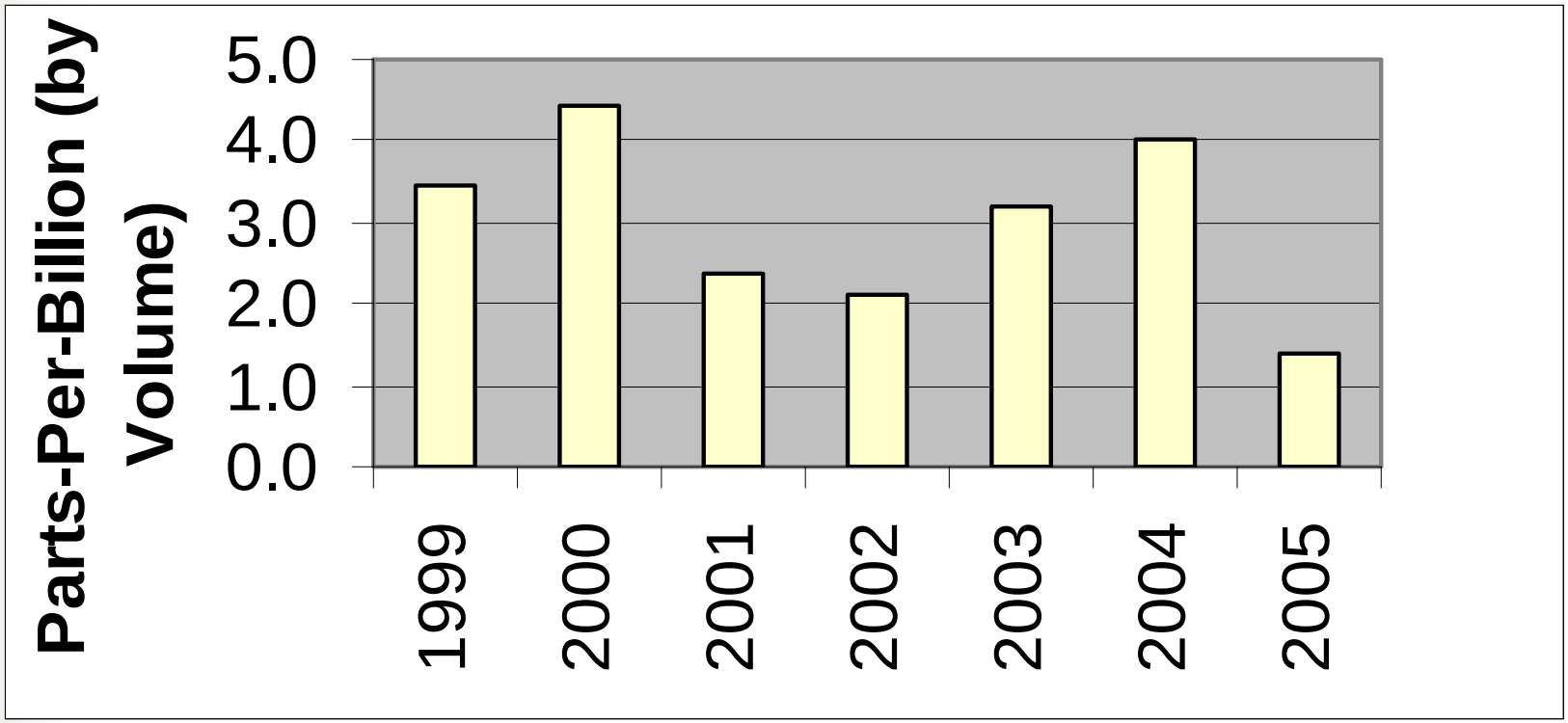
  $3x10^{-5}$ $(\mu g/m^3)^{-1}$

  1 ppbv represents a lifetime cancer risk of 1 in 15,000
- Sources include motor vehicle exhaust, manufacturing and processing facilities, forest fires or other combustion, and cigarette smoke

Region-wide 1,3-butadiene Trends (Data from TCEQ, compiled by GHASP)



Monitor A: Annual Average 1,3-Butadiene Concentration (ppbv)



Monitor A: Plant is to the Southeast

Monitor A 1,3-Butadiene Hourly Data (ppbv), Segregated by Wind Direction		
Wind Direction	2005 Avg Conc*	2006 Avg Conc#
North	0.30	0.15
Northeast	0.53	0.29
East	1.78	1.38
Southeast	6.72	4.14
South	1.05	2.04
Southwest	0.13	0.12
West	0.21	0.18
Northwest	0.23	0.17
No Hourly Wind Dir Data (Number of Hours with No Wind Data)	1.53 (989)	0.87 (327)
Annual Average	1.54	1.42

*1,3Butadiene data at this site began on 2/20/05.

#2006 data is year-to-date as of 10/9/06.

Monitor B: Plant is to the South

Monitor B 1,3-Butadiene Hourly Data (ppbv), Segregated by Wind Direction									
Wind Direction	1998 Avg	1999 Avg	2000 Avg	2001 Avg	2002 Avg	2003 Avg	2004 Avg	2005 Avg	2006 Avg#
North	0.20	0.31	0.13	0.21	0.14	0.19	0.23	0.14	0.15
Northeast	0.50	0.48	0.33	0.31	0.26	0.25	0.37	0.36	0.26
East	0.83	0.64	0.69	0.38	0.81	0.43	0.72	0.43	0.32
Southeast	0.32	0.25	0.24	0.20	0.27	0.23	0.29	0.23	0.18
South	3.37	1.32	1.59	0.74	0.77	0.89	1.57	0.63	0.50
Southwest	0.86	0.44	0.67	0.33	0.37	0.41	0.75	0.23	0.20
West	0.68	0.34	0.19	0.16	0.24	0.21	0.60	0.15	0.16
Northwest	0.23	0.29	0.17	0.18	0.24	0.23	0.44	0.20	0.18
No Wind Dir Data (No. of Hours)	0.20 (7)	0.10 (6)	0.40 (45)	0.34 (16)	0.32 (3)	0.68 (6)	2.14 (27)	0.24 (97)	0.04 (1)
Annual Average	1.16	0.59	0.63	0.36	0.41	0.40	0.69	0.32	0.29

#2006 data is year-to-date as of 10/9/06.

Monitor C: Plant is to the North

Monitor C 1,3-Butadiene Hourly Data (ppbv), Segregated by Wind Direction			
Wind Direction	2004 Avg Conc*	2005 Avg Conc	2006 Avg Conc#
North	2.98	1.75	0.92
Northeast	0.67	0.63	0.63
East	0.23	0.28	0.23
Southeast	0.14	0.13	0.10
South	0.15	0.19	0.10
Southwest	0.34	0.18	0.16
West	0.30	0.29	0.31
Northwest	0.65	0.45	0.28
No Wind Dir Data (Number of Hours with No Wind Data)	0.50 (252)	0.09 (1)	0.23 (1107)
Annual Average	0.54	0.45	0.25

*1,3Butadiene data at this site began on 4/30/04.

#2006 data is year-to-date as of 10/9/06.

Enforcement Results, 2000-2005

- EPA: 1 Violation Notice for failing to have required floating roofs on 3 tanks. Resulted in fine of $113,750
- TCEQ: 1 Violation Notice for fugitive monitoring violations. No enforcement results.
- COH: 20 Violation Notices for 1,3-butadiene emissions events, fugitive monitoring violations, nuisance odors, unauthorized wastewater emissions, rail car loading leaks and other issues. No enforcement results.
- Three COH Violation Notices are still being pursued by TCEQ.

Permitting Issues

- November 2000: The plant volunteered to be one of the first companies to participate in Texas' Voluntary Emissions Reduction Program, committing to obtain a permit for its "grandfathered" equipment and reduce emissions.
- 2002: BAQC identified cooling tower monitoring and 1,3-butadiene emissions issues at the plant.
- December 2004: Plant was issued a Voluntary Emissions Reduction Permit by TCEQ, authorizing 125 tons-per-year of VOC from the plant flare and 48 tons-per-year of VOC from cooling towers, with no 1,3-butadiene limits.

Timeline of Events Leading to Settlement Agreement

- January 2005: The Houston Chronicle published “In Harms Way”, an article by Dina Capiello.
- February 2005: Town Hall Meeting was held in the community to discuss 1,3-butadiene issues.
- February 2005: COH held a Public Hearing- Mayor Bill White challenged three plants to reduce butadiene emissions, identifying four key goals to improve air quality in the area.
- December 2005: The COH/1,3-Butadiene Plant Settlement Agreement was finalized.

Details of the Settlement Agreement

- Specific Emissions Reductions
- Email Alerts
- Periodic Reporting
- Limits On Sale of Emissions Credits
- LDAR Leak, Cooling Tower Leak and Fence Line Monitoring Responses by the Plant
- Independent Third Party Audits
- Equipment Upgrades
- Enforceability

Details of the Settlement Agreement Specific Emissions Reductions

1,3-Butadiene Emissions Reductions from 2005 to 2010

- ✓ Flare: 14.6 ton-per-year reduction
- ✓ Fugitives: 4.5 ton-per-year reduction
- ✓ Cooling Towers: 402 pound-per-year reduction
- ✓ Fence Line: Emissions impact will be no more than an annual average of 1 ppb

Details of the Settlement Agreement

Email Alerts

Alerts will be sent by email to the COH, at the same time the email alerts are received by the Plant's environmental staff for each of the following scenarios:

- ✓ Flare-10 pounds per hour or more of 1,3-butadiene was emitted from the flare.
- ✓ Fence Line-monitoring detected an hourly average fence line concentration of 25 ppbv or more.
- ✓ Cooling Tower-1 ppm of 1,3-butadiene or more was detected in the cooling water.

Details of the Settlement Agreement

Periodic Reporting

The Plant will submit Quarterly 1,3-butadiene emissions reports to COH beginning with the 4th Quarter of 2006.

Limits on Sale of Emissions Credits

The plant cannot sell 1,3-Butadiene or VOC emissions credits from emissions reductions to facilities in COH or to 1,3-Butadiene producers in Harris County.

Details of the Settlement Agreement

LDAR Leak, Cooling Tower Leak and Fence Line Monitoring Responses by the Plant

- ✓ LDAR leak definition reduced from 500 ppm to 250 ppm, beginning on January 1, 2006.
- ✓ An initial attempt must occur within one day for leaks monitored at concentrations above 100 ppm, beginning January 1, 2007.
- ✓ IR Camera will be used at least quarterly and during startups (this was initiated in the Fall of 2005).

Details of the Settlement Agreement

LDAR Leak, Cooling Tower Leak and Fence Line Monitoring Responses by the Plant (Continued)

- After January 1, 2007, if 1 ppm of 1,3-butadiene is detected in the cooling tower water, confirmation and repair attempts will be initiated within 24 hours and repairs will generally be completed within 30 days.
- If an hourly average of 25 ppbv is measured at the fence line, an on-site investigation will be initiated by the plant to identify and correct contributing conditions.

Details of the Settlement Agreement

Independent Third Party Audits

Audits will be conducted to confirm emissions reductions. A list of potential auditors was approved by COH.

Equipment Upgrades

- ✓ Flare gas recovery
- ✓ Dry-break fittings on rail loading lines
- ✓ Wastewater improvements
- ✓ Gas Chromatographs on Cooling Tower and Flare
- ✓ FTIR open path monitoring along the north and south fence lines

Details of the Settlement Agreement

Enforceability

- ✓ COH releases claims prior to the effective date of the Settlement Agreement.
- ✓ COH can take action for any subsequent violations and breach of contract if the Plant fails to comply with the terms of the Settlement Agreement.
- ✓ Force Majeure for circumstances beyond the Plant's reasonable control, but not for malfunctions or unanticipated or increased expenses.

Moving Forward

- Monitor Settlement Agreement deliverables
- Work with other regulatory agencies to address problems that impact COH air