Community Scale Toxics Ambient Air Monitoring in Louisville, Kentucky October 3, 2007

Presented By
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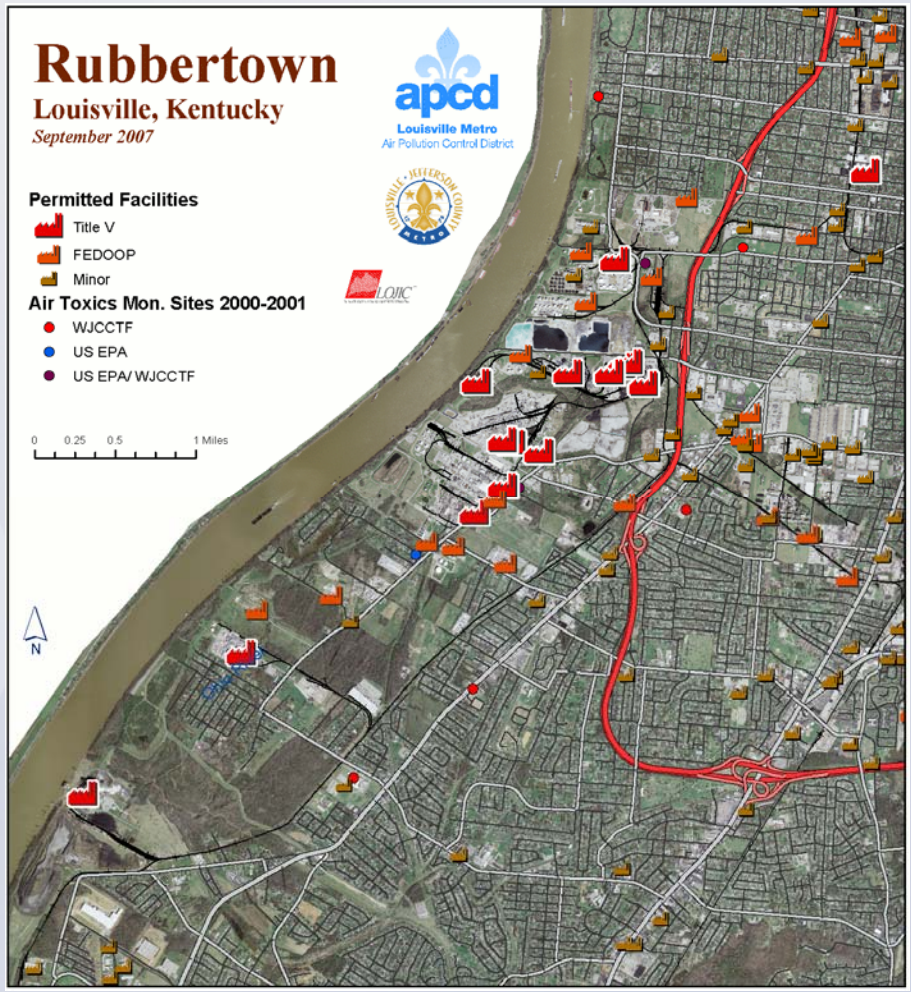
The Problem

Residents in west Louisville, KY were concerned that they were being exposed to unsafe concentrations of toxic air pollutants from local industries, area and mobile sources.



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The Decision

1996-2000 Task Force: Use data collected in a yearlong study to conduct a risk assessment to determine whether the residents were being exposed to unsafe levels of air toxics.

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Monitoring Plan

Monitor for the most hazardous air pollutants listed in the Toxics Release Inventory database for the Rubbertown industrial complex for which there were standard sampling and analytical methods.

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Monitoring Site Selection [Grant – Part 1]

- 25 Sites evaluated
- All sites visited by several members
- Public meetings to discuss and select sites
- Used computer dispersion modeling
- Agreement on the need for:
  - Background site
  - Fenceline sites
  - Neighborhood sites
  - Control site
- 12 sites chosen +1 colocated

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The Monitoring Sites

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Resources

- **EPA** – Community-Based Environmental Project (CBEP) funding, monitors, guidance, analytical work, modeling information
- **Kentucky DAQ –** Funding, advice, guidance
- **University of Louisville** –Analytical work and administrative support for Task Force
- **APCD** – Set up monitoring sites, operated monitors, collected samples

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West Louisville Air Toxics Study
WLATS

- 1-Year Monitoring Study
  - April 2000 to April 2001
- Monitored
  - 83 Volatile Organic Compounds (TO-15)
  - 63 Semi-Volatile Organic Compounds
  - Formaldehyde, HCl, HF
  - 20 Metals
- One-in-12 day sampling
- Required 75% data recovery

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Air Toxics in Louisville

- **2001-2002 -** Sample analysis & Risk assessment work plan
- **2002 –** EPA Region 4 relative risk screening analysis ranked Louisville as having the highest risk of exposure in the Southeast
- **2002-2003 -** Risk management plan & Risk assessment report

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West Louisville Air Toxics Study

- Results released in 2003:
  - Greater than 1-in-one million cancer risk for 17 carcinogens
  - An unsafe level of noncancer effects for 1 chemical: Hazard Quotient (HQ) of 13.9

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WLATS Study 2

4th Quarter 2001 through 2005

Differences from 1st Study:

- 6 of original 12 monitoring sites
  - Fenceline sites
  - Neighborhood sites
  - Control site
- Monitoring for only TO-15 VOCs by University of Louisville

  Of the original 17 carcinogens of risk > 10^{-6},
  5 were not monitored: 4 metals and formaldehyde

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WLATS Study 2 Results

Highest single-year cancer risk

Chemical Compound	Study 1	Study 2
Acrylonitrile	130	124
Benzene	32	21
Bromoform	13	<1
1,3-Butadiene	500	1370
Carbon Tetrachloride	14	12
Chloroform	77	45

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WLATS Study 2 Results

Highest single-year cancer risk

Chemical Compound	Study 1	Study 2
1,4-Dichlorobenzene	19	<1
Ethyl acrylate	33	6
Methylene Chloride	17	<1
Tetrachloroethylene	39	3
Trichloroethylene	16	<1
Vinyl Chloride	5	8

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WLATS Study 2 Results

Highest single-year risk

Chloroprene

- **Hazard Quotient (noncancer) 59.3 [97.3]***

  *** In Study 1, the reported HQ was 13.9, but the HEAST 7 ug/m³ RfC was used although the California 1 ug/m³ REL was higher in the stated hierarchy for references**

- **Cancer Risk**

  Exceeded 10,000 in one million each year

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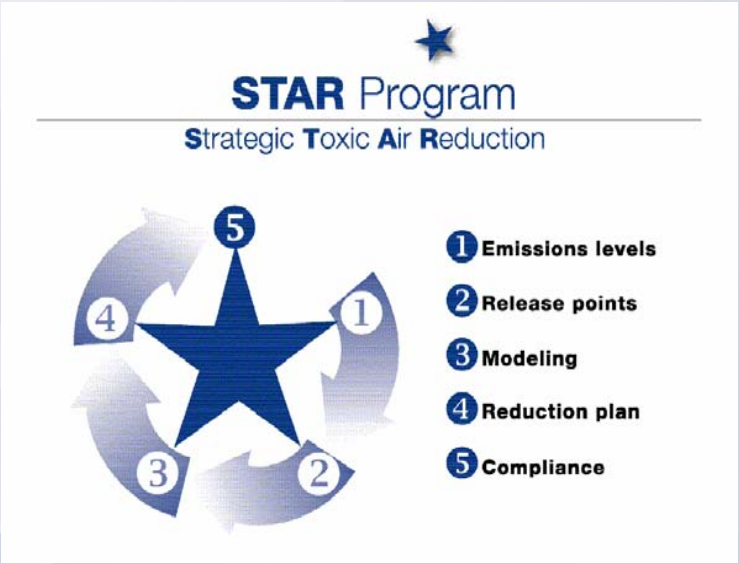
Outcomes of Study 1

- 2003-4: Drafting of toxics program with support from the Mayor and Board
- Sept 2004: Draft regulations released to the public
- June 2005: Board adopts the STAR program



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What makes STAR groundbreaking? Regulation 5.30

Stakeholder Group met for 1 year to determine:

- Environmental acceptability from mobile/nonroad, area and minor sources
- Reg 5.30 addresses, uniquely, the *cumulative* cancer and noncancer risk goals from all sources large and small
  - 35 recommendations sent to APCB

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The Plan of Action

Recommended Reduction Strategies

Strategies for reducing actual emissions

Strategies for reducing exposure to emissions

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Instrumentation Purchases for Future Monitoring
[Grant – Part 2]

- One instrument does not fit all needs and desires:
  - Portability versus site establishment
  - Screening tools at high levels versus readings at levels that introduce >1-in-one million risk
  - Enforceability – what do you do with the numbers once you have them

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Selection Process

- Accumulated vendors' materials: UV, IR, portable GC/MS's, portable TEOMs, aethalometer, FLIR, ….
- Discussed potential options with EPA and other States/Locals
- Visited monitoring sites (Texas, Florida and Kentucky) with installed equipment other than Summa canisters

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Selection Process

- 2006: EPA Region IV staff conducted a field investigation comparison of their Cerex UV Sentry and EPA Method TO-15
- Three 1-hour runs were attempted at three sites

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Sentry vs TO-15 Results

- Agreement of 20% required Ⓟ only 1,3-butadiene met this QAPP criterion
- Sentry detection limits much higher
- Raw data collected in the field were reprocessed off-site by Cerex
- Calibration of Sentry only with a sealed span check device called a “lollipop” that contains SO_2 and benzene

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Cerex UV Sentry Study Conclusions

- Useful in determining temporal variations of a limited number of analytes
- Useful in determining potential area of highest concentrations and impact of a limited number of analytes
- Additional software development of real-time concentration values is needed rather than the necessity of post-processing
- Needs to lower detection limits to sub-part-per-billion
- Use of a reference method for QC confirmation needed, especially for enforceability

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Instrument Capability Considerations

- Can it perform fenceline monitoring for an extended period of time?
- Can it provide near real-time data?
- Are the field detection limits low enough to achieve risk-level measurements for a number of chemicals?
- How quickly can the instrument be set up if necessary in emergency settings?

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Instrumentation Choice

- Combination IR and UV systems
- Stirling engine rather than liquid nitrogen
- Portable trailer for mobility
- On-site security remains an issue to be solved in the future

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