

# **Overview of Air Accountability Program Objectives and Needs**

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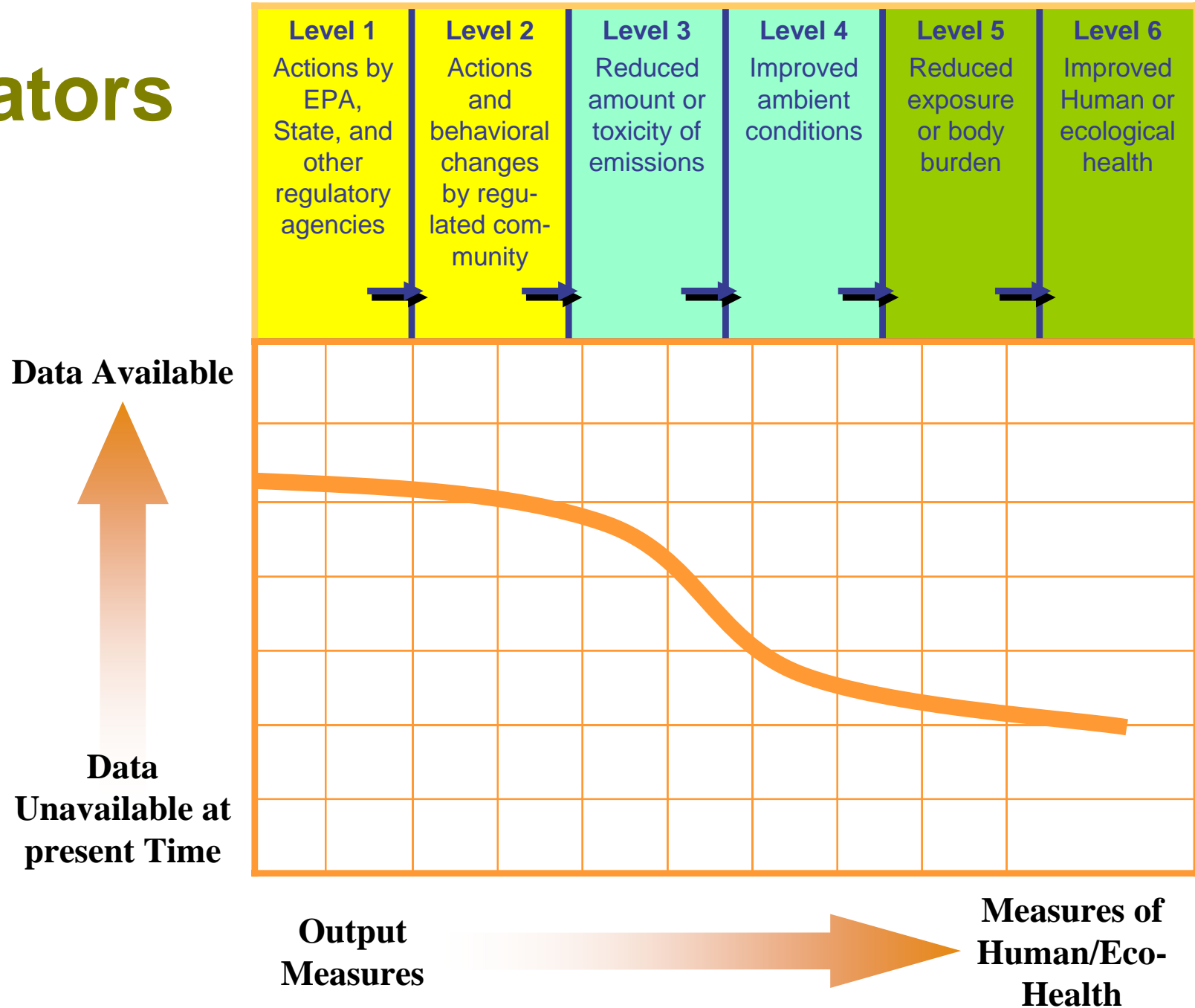


# EPA's Mission

- “To protect human health and to safeguard the natural environment — air, water, and land — upon which life depends.”
- How do we measure our effectiveness?

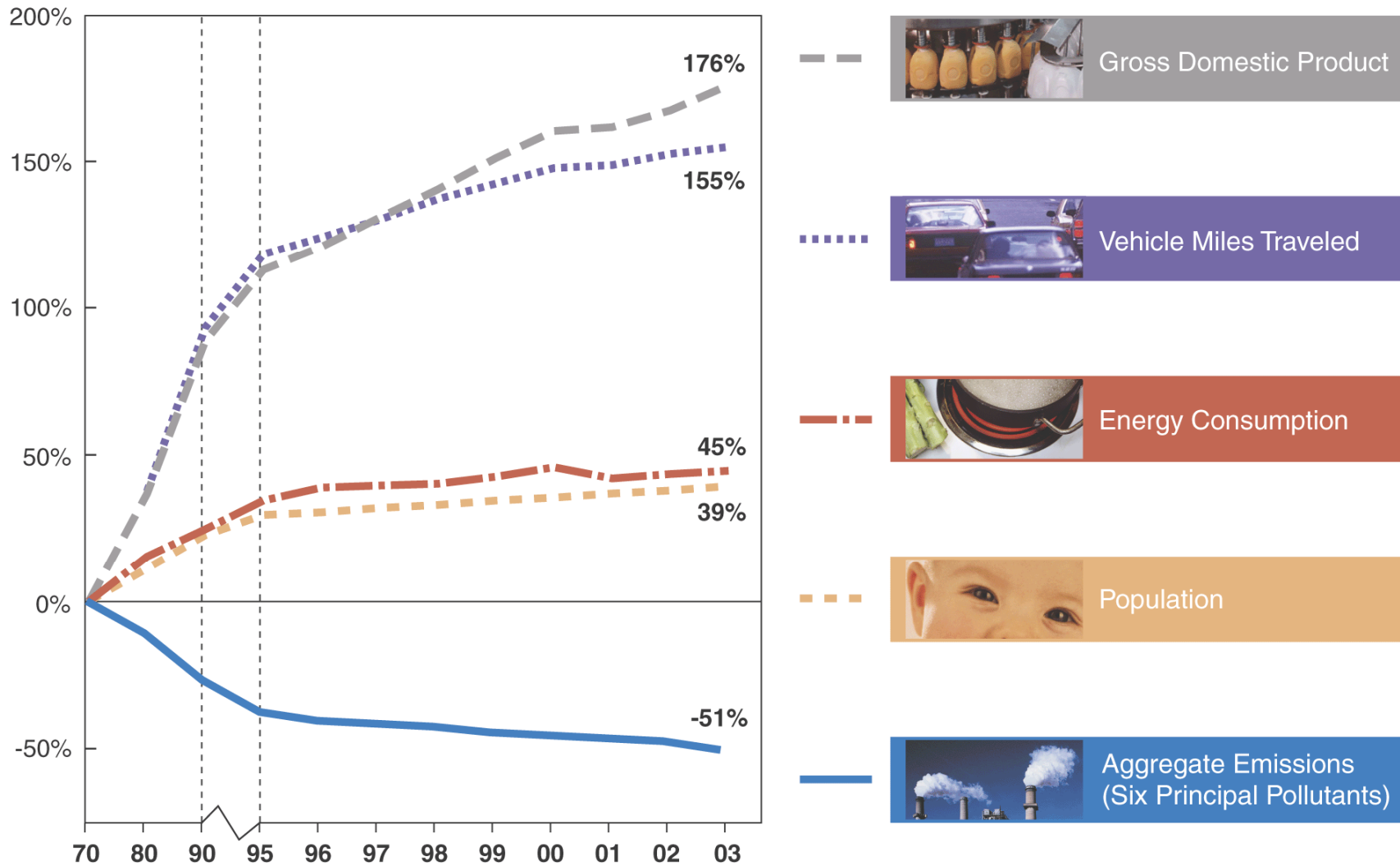


# Indicators



# EPA progress in reducing emissions (Level 3 Indicator)

Comparison of Growth Areas and Emissions



Source: National Air Quality and Emissions Trends Report, 2003 Special Studies Edition

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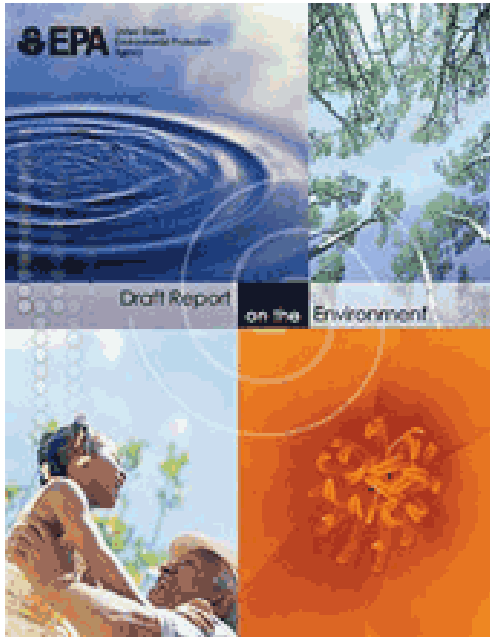
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# Measuring Effectiveness Important

Detroit News (May 7, 2000)

- An evaluation of EPA's first 30 years
- "Air and Water are cleaner, but health gains unclear"



EPA Draft Report on the Environment

- "There is a need for measures to compare actual and predicted human health and ecological effects related to exposure to air pollutants."

National Research Council

- *Recommendation:* "Develop and implement a system to assess and monitor human health and welfare effects through the identification of indicators capable of characterizing and tracking the effects of air pollutants"

Health Effects Institute

- "Measuring the Health Impact of Actions Taken to Improve Air Quality"





# CAAAC AQM Workgroup Recommendations

EPA should work with health effects experts to develop measures to define and assess human health impacts of air pollution and ways to track and evaluate progress in reducing those impacts

- Facilitating communications among health research and program accountability efforts
- Expanding on-going efforts into public health and air quality accountability
- Undertaking specific accountability efforts
- Work with S/L/T to determine appropriate metrics to track progress

CAAAC – Clean Air Act Advisory Committee

AQM – Air Quality Management Subcommittee

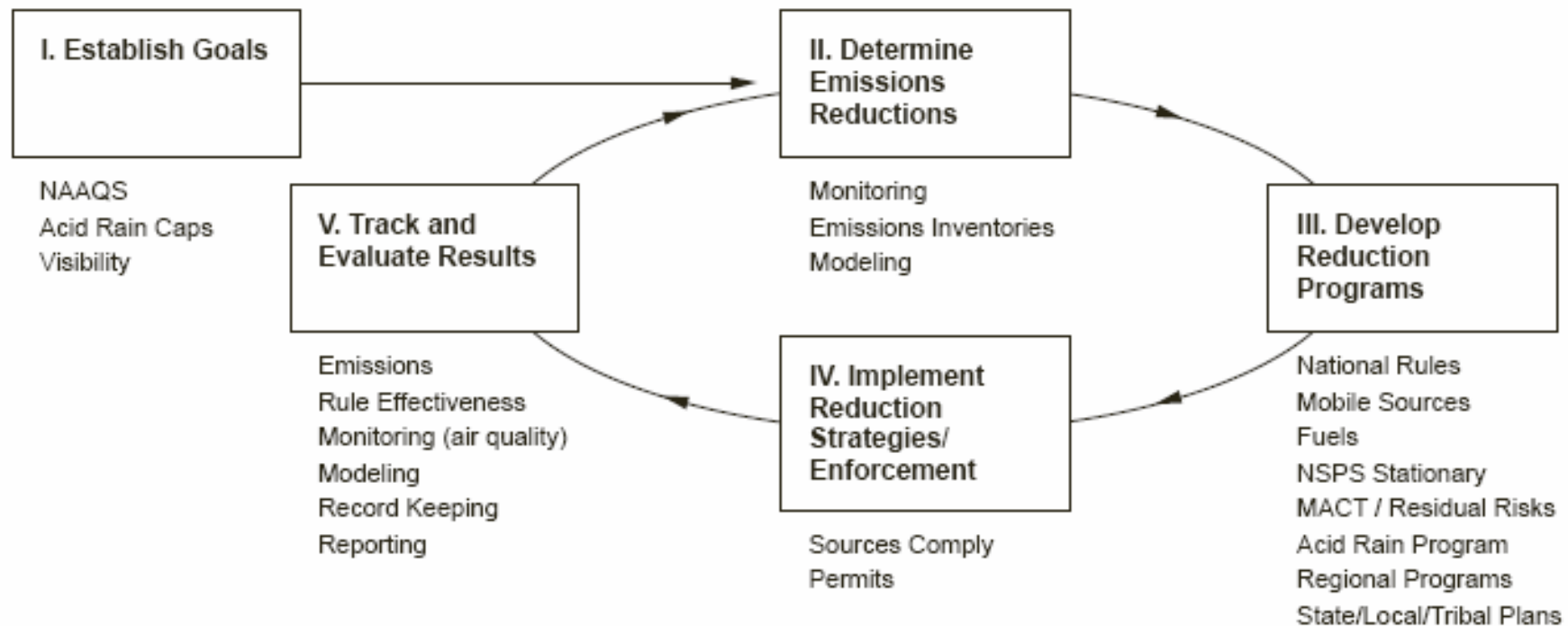


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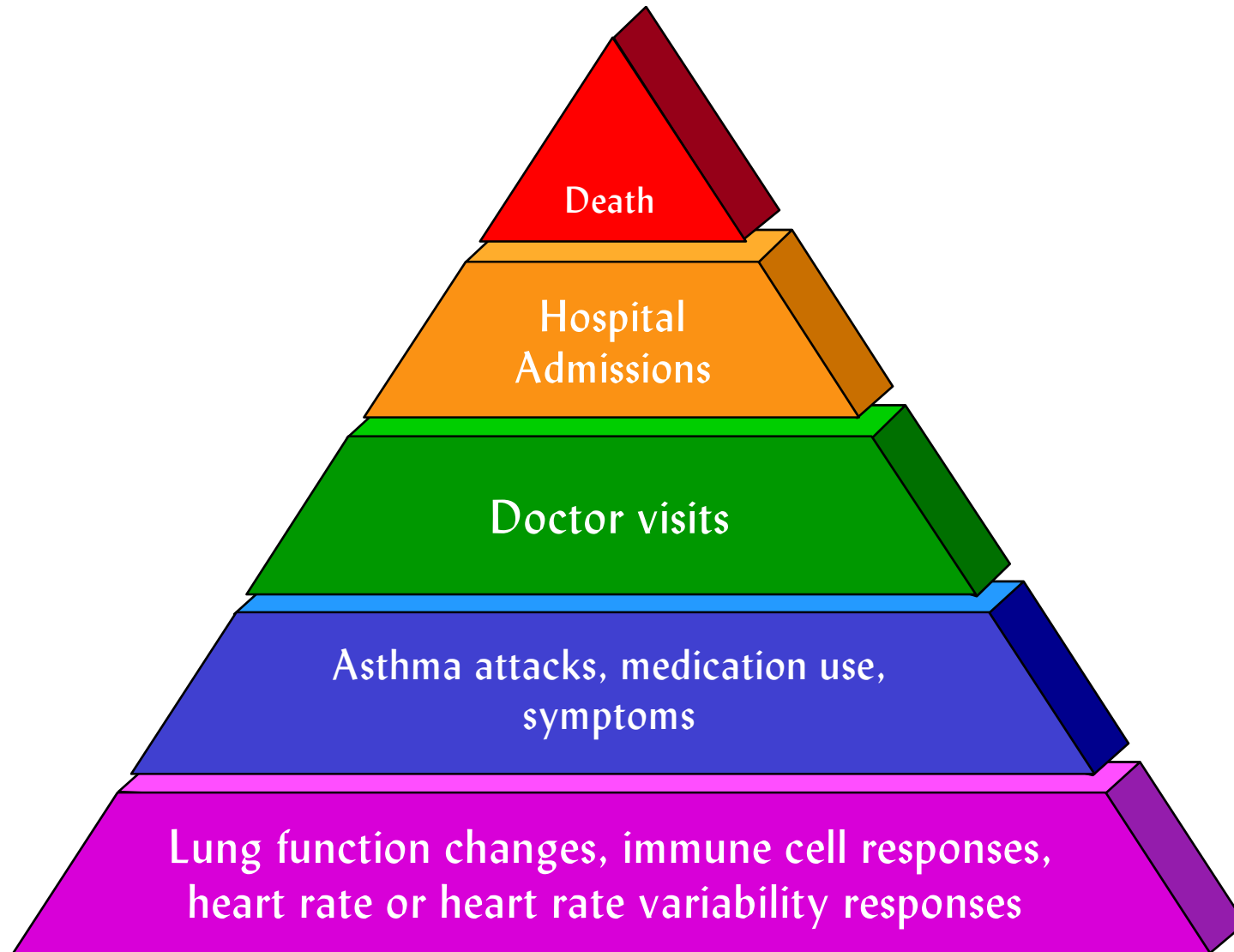
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# CAAAC AQM Workgroup Recommendations

- Air quality management should be an iterative process
  - Evaluate results, and then
  - Revise reduction programs accordingly
- <http://www.epa.gov/air/caaac/aqm.html>



# “Pyramid of Effects”



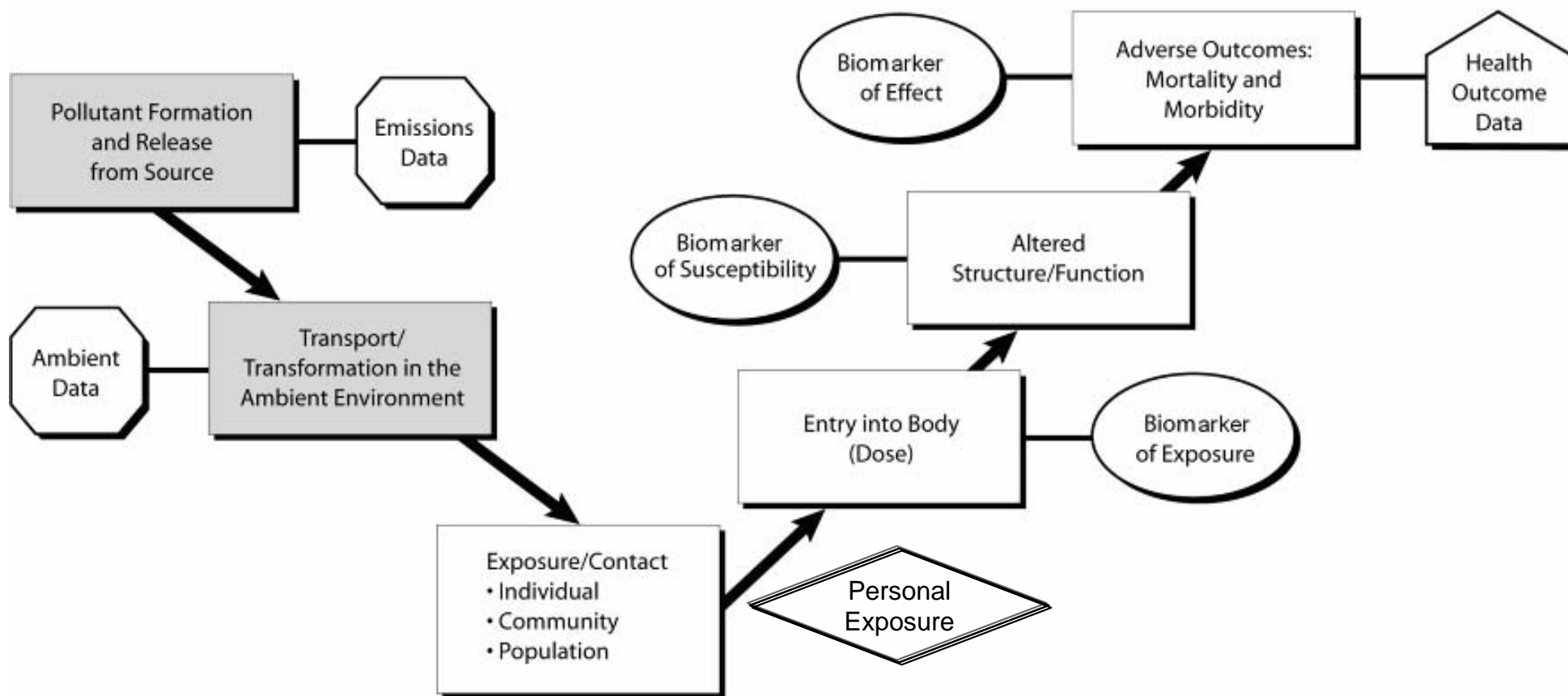


# Estimated Incidence Reductions from CAIR in Eastern US by 2015

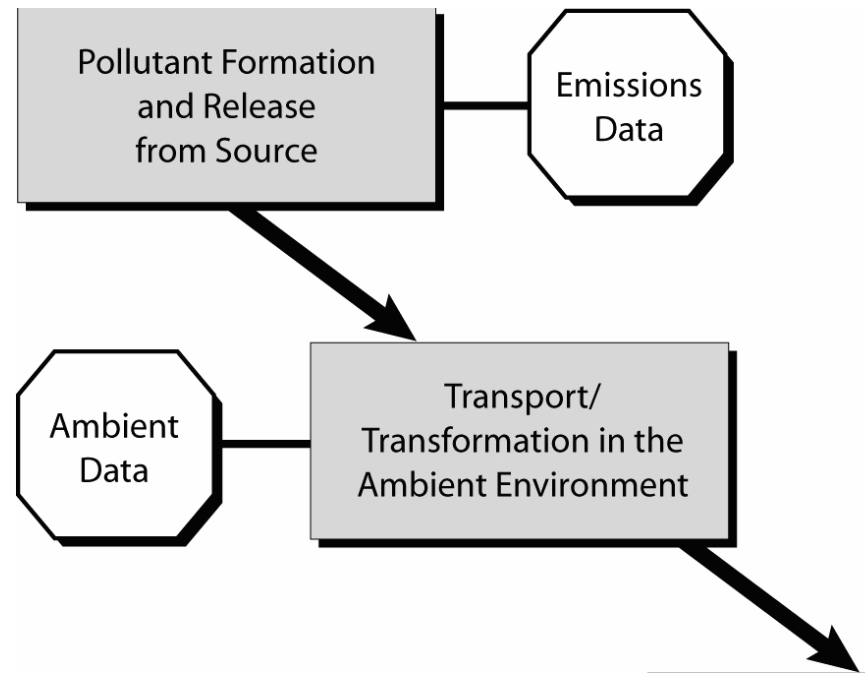
- PM-related endpoints
  - Premature mortality 17,000
  - Non-fatal MI 22,000
  - Asthma exacerbations 290,000
  - Work loss days 1,700,000
- Ozone-related endpoints
  - Hospital admissions 2,800
  - School absence days 510,000



# Environmental Public Health Paradigm



# Traditional Evaluation of Regulatory Management Decisions/Actions



Process indicators such as decreases in emissions, discharges and pollutant levels in environmental media



# Accountability

The Agency's desire to be more accountable to the public in demonstrating true environmental process

Action: to develop and validate environmental public health indicators (EPHIs)

- Intended to reflect more closely the actual impact on public health that result from environmental decision-making
- Help clarify the benefits and costs associated with further incremental environmental improvements



**What is the Difference between:**  
Accountability  
Epidemiology  
Environmental Public Health Tracking



# Environmental Public Health Tracking (EPHT)

“The goal of EPHT is to protect communities by providing information to federal, state, and local agencies. These agencies, in turn, will use this information to plan, apply, and evaluate public health actions to prevent and control environmentally related diseases.”

<http://www.cdc.gov/nceh/tracking/background.htm>





# Epidemiology

“The study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control of health problems.”

Last JM. 2001. A Dictionary of Epidemiology. New York. International Epidemiological Association, Inc.



# Epidemiology/EPHT/Accountability

Epidemiology is research

- Both EPHT and accountability will use epidemiologic research to guide decisions
- Possibility exists that data generated for EPHT and accountability can be used in epidemiologic research

EPHT will assess trends over time to determine hazards to health in which interventions can be made

- EPHT will assess interventions

Accountability will assess interventions

- Epidemiologic tools will be one of many disciplines utilized to develop indicators
- The possibility does exist that some of the same indicators used for hazard identification in EPHT can be used in accountability assessments



# Key Research Questions for Evaluating Public Health Outcomes

- What research is needed to demonstrate the relationship between EPA mandated/voluntary action and exposure reduction programs and actual health benefits?
- What tools, methods or data currently exist to evaluate EPA actions for public health benefit?
- What tools, methods or data need to be developed to evaluate EPA actions for public health benefit?



# EPA Activities

- OAR & ORD
  - Air Accountability Framework Team
- OAQPS
  - Health Indicators Team
- ORD
  - Accountability Initiative
- ORD & OEI
  - EPA's Report on the Environment

OAR = Office of Air; ORD = Office of Research and Development; OAQPS = Office of Air Quality Planning and Standards; OEI = Office of Environmental Information



# Air Accountability Framework Team



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# Approach

- Create cross-agency framework team
- Produce draft framework design
  - Prospective design, retrospective proof-of-concept
  - Indicators, monitoring, data streams, and protocols
- Reach out to partners
  - Select two testbeds
- Conduct a first order demonstration
- Apply results
  - Future monitoring and indicators development
  - Future assessment design





# EPA's Core Air Accountability Framework Team

## Steering and Synthesis

(Two from each team plus others)

J. Vickery & R. Scheffe

Team Co-Leads

## Emissions Indicators and Measurements

Rich Cook  
Andy Miller

## Air Quality Indicators and Measurements

James Hemby  
Tim Watkins

## Human Exposure Indicators and Measurements

Alan Vette  
John Girman

## Ecosystem Deposition and Effects Indicators and Measurements

David Schmeltz  
Betsy Smith

## Human Health Effects Indicators and Measurements

Susan Stone  
Danelle Lobdell



# OAQPS Health Indicators Team



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# OAQPS Feasibility Studies

- NATA risk estimates – taken over by ORD
  - Correlation to actual cancer incidence rates
  - Reduction in risk by SES
- School absences – not feasible now
  - County-level absence data; 98 NMMAPS counties
  - Times series analysis
- Medicare data – developing study design
  - Urgent clinic visits for respiratory and cardiovascular disease
  - Matching approach – propensity scores
- Syndromic surveillance - unfunded



# OAQPS/ORD Accountability Study

- National-Scale Activity Survey (N-SAS) - evaluate behavioral responses to AQI advisories
  - Cross-sectional – demographic and awareness information
  - Longitudinal – activity pattern data
  - Policy applications
    - Evaluate AQI effectiveness at reducing exposure
    - Enhance outreach programs
    - Improve risk assessments
    - Improve accountability assessments
    - Address uncertainty in modeling health effects for criteria pollutants



# ORD Accountability Initiative



# ORD's Accountability Initiative Implementation Process

- Built around “proof-of-concept” projects
- Program/Regional offices submit pre-proposals targeting actions/activities for which they desire to measure progress using EPHIs
- Subset selected for full proposal development by an ORD Design team





# Cumulative Air Pollution Reduction Programs and Environmental Public Health Indicators for Children and Elderly

## Background:

- New Haven, CT – Funded for EPA Community Air Toxics Project
  - Implemented a comprehensive Clean Air Initiative
  - Includes a number of voluntary and regulatory air pollution programs
- Development and validation of EPHIs are needed
- Existing health and environmental data are available across the United States
  - However, knowledge of these existing data may not be known
  - May have access limitations
  - Health and environmental data may not be compatible to link



# Cumulative Air Pollution Reduction Programs and Environmental Public Health Indicators for Children and Elderly

## Objectives:

- Existing human health and ambient exposure-related data availability and accessibility in New Haven, CT - applied to an air accountability study?
- Define what types of *de novo* data collection will be needed to cover gaps in information not available in the existing health or exposure data
- Develop collaborations and partnerships with state and local agencies including government, academia and community
- Conduct air quality modeling and evaluation of cumulative exposure assessment modeling that can be used potentially to link with health data
- Assess the feasibility of conducting an air accountability study in New Haven, CT



# **EPA Report on the Environment 2007 (ROE)**



# ROE

## Purpose:

Pose important questions – of trends in environmental condition and possible associated human health and ecological impacts – relevant to EPA’s mission

## Principles:

- Maintain the objectivity of the indicators; this is not a program report
- Keep focused with EPA lens; but not an Agency report card
- Complement the Agency’s Strategic Planning efforts
  - inform development of strategic outcomes
  - need for better outcomes drive data priorities
- Identify gaps in the information to be helpful in our decision-making about how to invest in the future

## Scope:

- Air, Water, Land, Human Health, and Ecological Condition Chapters
  - Questions, Indicators, Gaps and Limitations
  - National but will contain region-specific “examples” and regional subsets of national trends

## Products:

- Technical Document, Highlights of Conditions and Trends (based on Technical Document), e-ROE( will be interactive and will contain both documents)

<http://www.epa.gov/indicators/>



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# Questions and Indicators for:

## Air Chapter

**What are the trends in outdoor air quality and their effects on human and the environment?**

PM emissions, SO<sub>2</sub> emissions, VOC emissions, Lead emissions, Air toxics emissions, CO emissions, Mercury emissions, Ambient PM concentrations, Ambient ozone concentrations, Ambient concentrations of select air toxics, Ambient CO concentrations, Ambient NO<sub>x</sub> concentrations, # and % days with AQI values > 100, Ambient Manganese metal compounds concentration in Region 5, Ozone and PM concentrations for U.S. counties in the U.S./Mexico border region, Concentrations of ozone depleting substances, Acid deposition, Lake and stream acidity, Ozone injury to forest plants, Regional haze

**What are the trends in greenhouse gas emissions and concentrations?**

U.S. greenhouse gas emission, Atmospheric concentrations of greenhouse gases

**What are the trends in indoor air quality and its effects on human health?**

U.S homes above EPA's radon action level, Blood cotinine levels

## Health Chapter

**What are the trends in health status in the U.S.?**

Life Expectancy at Birth, Infant mortality, General Mortality

**What are the trends in human disease and conditions for which environmental pollutants may be a risk factor, including across population subgroups and geographic regions?**

Cancer Incidence, Childhood Cancer Incidence, CVD Prevalence and Mortality, Asthma Prevalence, COPD Prevalence and Mortality, Infectious Diseases Associated with Environmental Exposures or Condition, Low Birthweight, Birth Defects Occurrence and Mortality, Preterm Delivery

**What are the trends in exposure to environmental pollutants including across population subgroups and geographic regions?**

Blood Lead Level, Blood Mercury Level, Blood Cadmium Level, Blood POPs Level, Urinary Pesticide Level, Urinary Phthalate Level, Blood cotinine levels



# Future

- Plan to update data yearly in the e-ROE
- Produce new document every three years to reevaluate the questions and indicators
  - What is the appropriate scale for indicators?
    - Report itself will always be National in scope
    - Regional?
    - State?
    - Local?





# Leverage Work From Extramural Activities?



# National Center for Environmental Research

- Current RFA: Development of Environmental Health Outcome Indicators  
[http://es.epa.gov/ncer/rfa/2006/2006\\_star\\_ephi.html](http://es.epa.gov/ncer/rfa/2006/2006_star_ephi.html)

Closing date: December 14, 2006

- Airborne Particulate Matter Research Centers
  - Johns Hopkins Particulate Matter Research Center
  - Harvard Particle Center
  - Southern California Particle Center
  - San Joaquin Valley Aerosol Health Effects Center (University of California, Davis)
  - Rochester PM Center[http://cfpub.epa.gov/ncer\\_abstracts/index.cfm/fuseaction/outlinks.centers/centerGroup/19](http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/outlinks.centers/centerGroup/19)

- Prospective Study of Atherosclerosis, Clinical Cardiovascular Disease, and Long-Term Exposure to Ambient Particulate Matter and Other Air Pollutants in a Multi-Ethnic Cohort  
[http://cfpub.epa.gov/ncer\\_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/7131/report/0](http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/7131/report/0)



# Health Effects Institute (HEI)

## Air Accountability Efforts

- Douglas Dockery, *Harvard School of Public Health, Boston, MA* Effect of air pollution control on mortality and hospital admissions in Ireland
- Frank Kelly, *King's College London, London, United Kingdom* Congestion charging scheme in London: assessing its impact on air quality and health
- Frank Kelly, *King's College London, London, United Kingdom* The London Low-emission zone baseline study
- Richard Morgenstern, *Resources for the Future, Washington, DC* Accountability assessment of Title IV of the Clean Air Act Amendments of 1990
- Curtis Noonan, *University of Montana* Assessing the Impact on Air Quality and Children's Health of Actions Taken to Reduce PM<sub>2.5</sub> Levels from Wood Stoves
- Jennifer Peel, *Colorado State University, Fort Collins, CO* Impact of Improved Air Quality During the 1996 Atlanta Olympic Games on Multiple Cardiorespiratory Outcomes
- Annette Peters, *GSF-Forschungszentrum für Umwelt und Gesundheit, Neuherberg, Germany* Improved air quality and its influences on short-term health effects in Erfurt, Eastern Germany
- Chit-Ming Wong, *University of Hong Kong* Impact of the 1990 Hong Kong Legislation for Restriction on Sulfur Content in Fuel

<http://www.healtheffects.org/ongoing.htm>



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# Key Issues and Challenges in Accountability

- Common research issues - intensified
  - Statistical power
  - Data availability
  - Confidentiality
- Multiple partners with stake in outcome
- Cross-disciplinary design
- Indicator development



# Questions

