


Linking the Environment to Chronic Health Issues

Updated Surveillance for Childhood Cancers and the Environment – Exposure Assessment to Air Pollutants

April 28, 2009 - Jeff Myers, WDNR Environmental Toxicologist
Wisconsin Environmental Health Association 2009 Meeting
Madison, Wisconsin



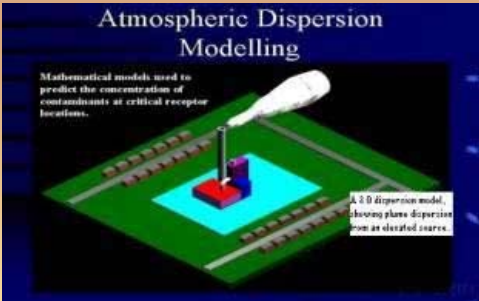
Air Pollution Exposures

- Air Pollutants Have Been Linked to Cancer
- Sources of air pollutants include:
 - Stationary Sources – Factories, Dry cleaners, Gas Stations
 - Mobile Sources – Vehicles, Trains, Boats, Airplanes, Lawn and Garden Equipment
- Monitoring exposures is best, but cost is too great – as a result – reliance on computerized air dispersion models

Air Dispersion Modeling

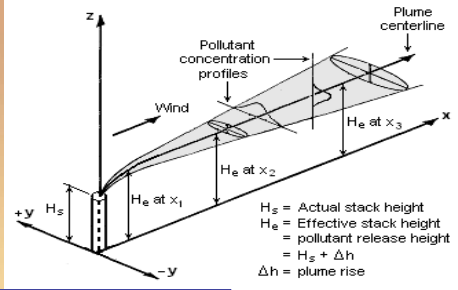
Atmospheric Dispersion Modelling

Mathematical models used to predict the concentration of contaminants at critical receptor locations.



A 3-D dispersion model, showing plume dispersion from an elevated source.

Gaussian Plume Algorithm

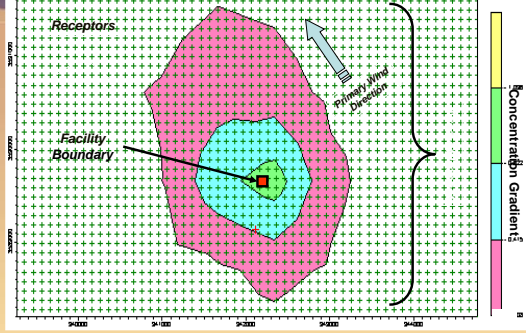


H_s = Actual stack height
 H_e = Effective stack height = pollutant release height = $H_s + \Delta h$
 Δh = plume rise

Major Assumptions: No chemical reactions & Constant Level of Emissions – typically over a year, but can also use hourly emission rates

http://upload.wikimedia.org/wikipedia/commons/1/10/Gaussian_Plane.png

Air Dispersion Modeling Results in Exposure Estimates

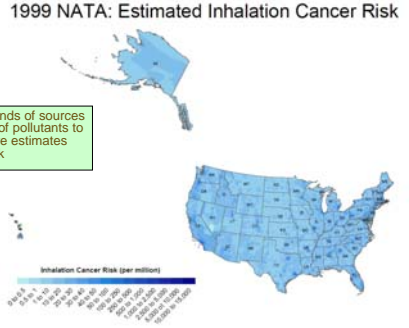


Output – 24 hour or Annual Average Concentrations at Each Location (receptor)

EPA National Air Toxics Assessment

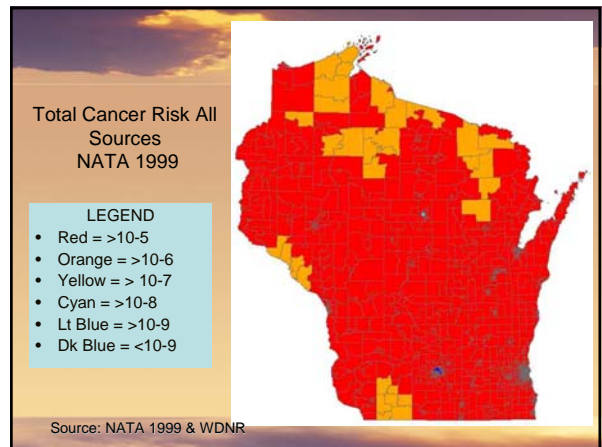
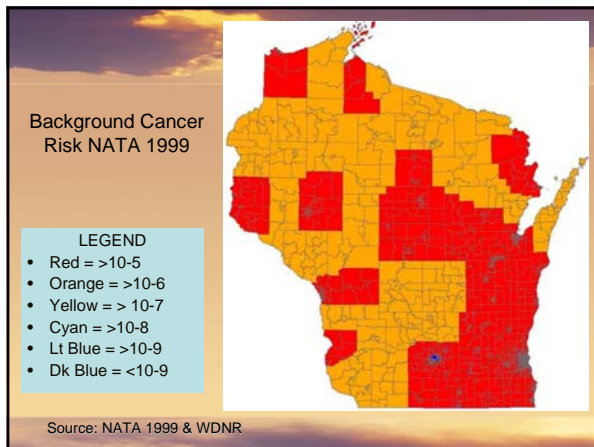
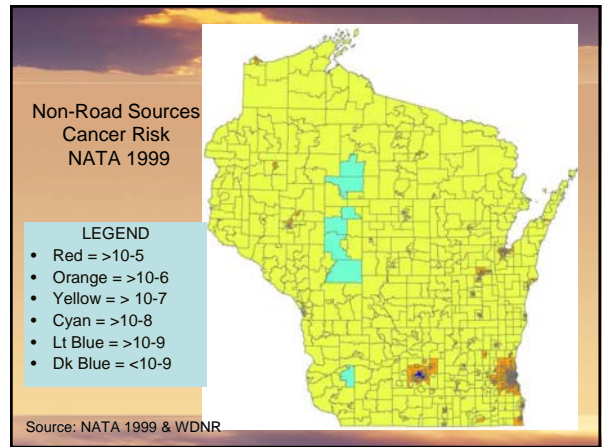
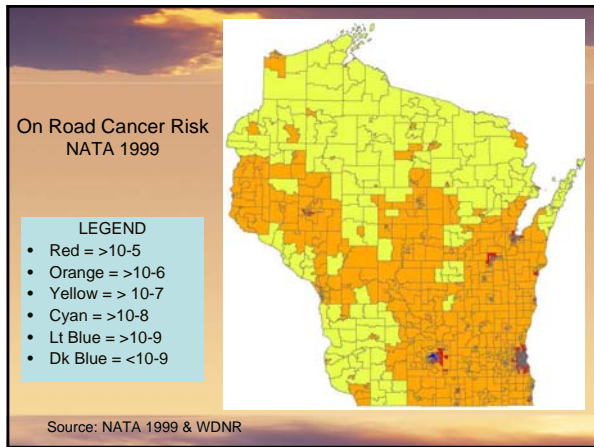
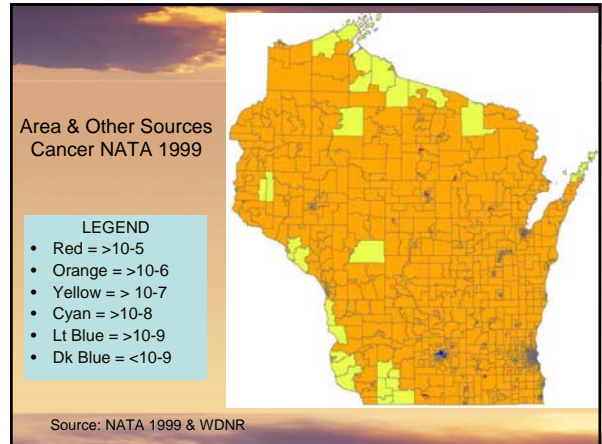
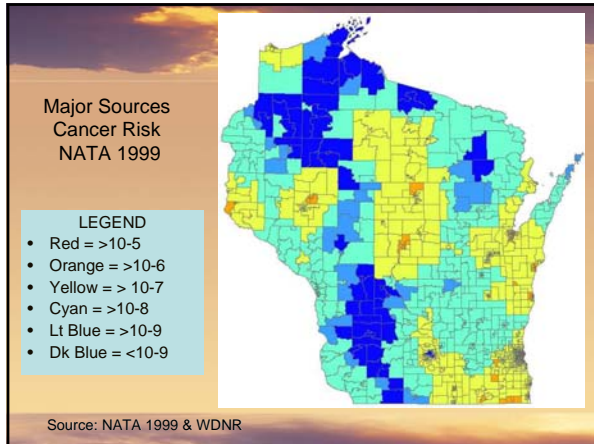
1999 NATA: Estimated Inhalation Cancer Risk

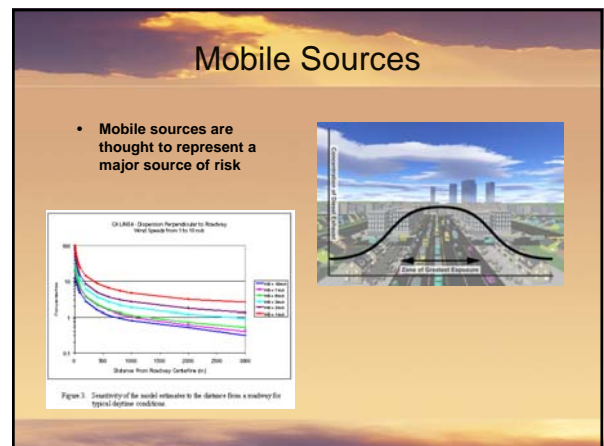
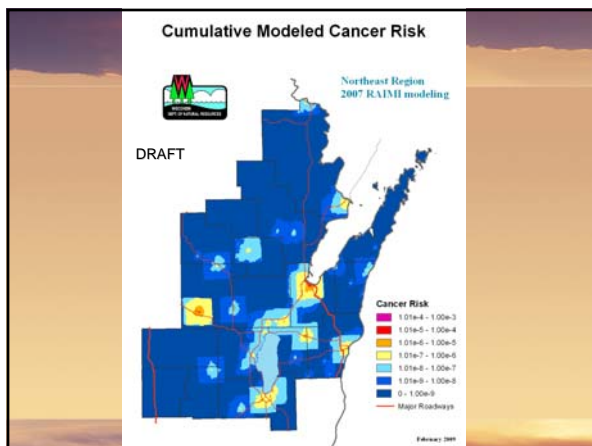
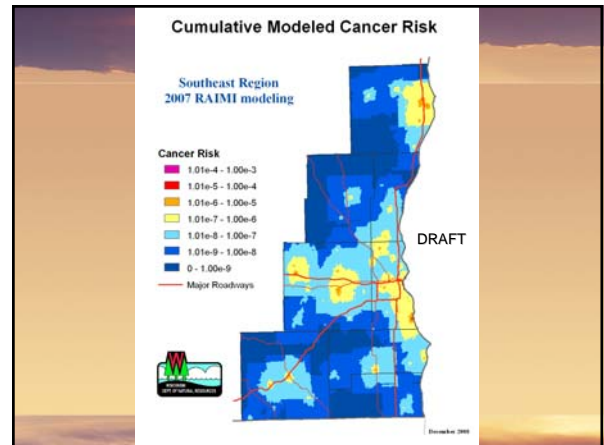
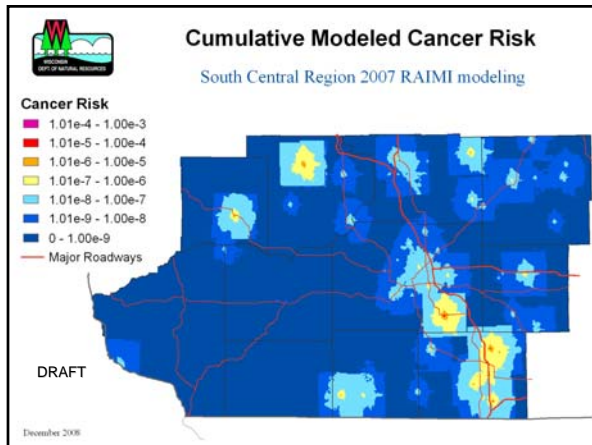
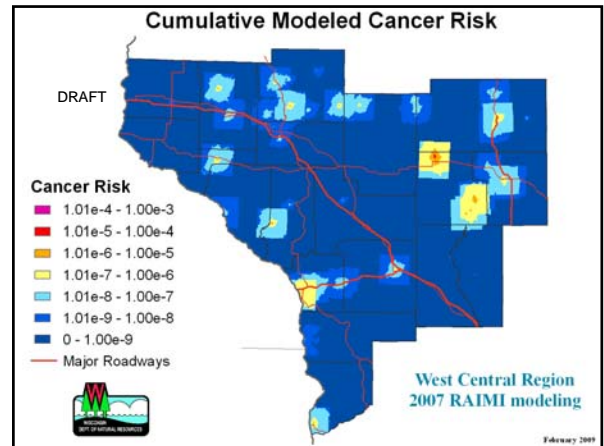
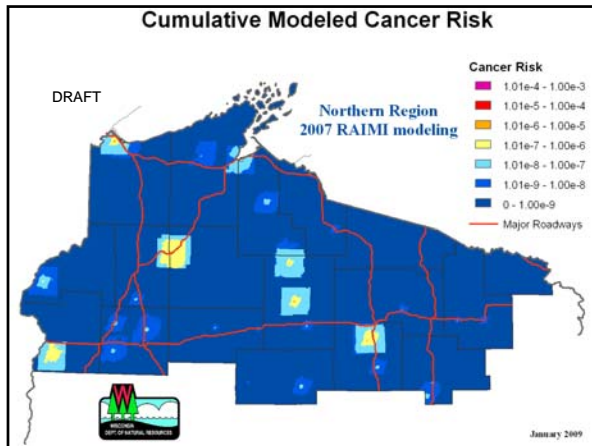
- Models thousands of sources and hundreds of pollutants to derive exposure estimates and assess risk



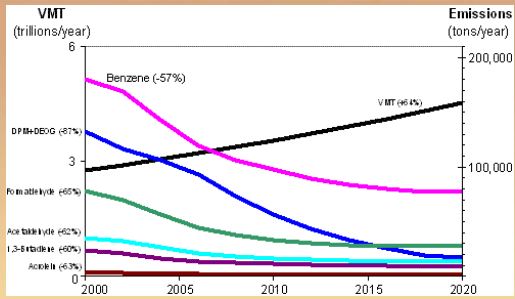
Inhalation Cancer Risk (per million)

Source: <http://www.epa.gov/ttn/atw/nata1999/nsata99.html>





EPA Regulations Help Reduce On-road Mobile Source Emissions



Good News – People are Working on the Problem

Adding On-Road Emissions



Any Questions???



Jeff Myers
 WDNR Bureau of
 Air Management
Jeff.myers@wi.gov
 608.266.2879